

FLORA OF ASSAM

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VOL. I. (PART II).

LINACEÆ TO MORINGACEÆ



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PREFACE

Part II of Vol. I includes the botanical and vernacular names of species described in both Part I and II. The vernacular names alone cannot be used for the identification of the species, as these vary from district to district and even within the limits of one district. In many cases several species are known locally by the same vernacular name. It is therefore necessary to issue a warning and to point out the necessity for checking the plants in detail with the description given in the Flora.

Since sending the materials of the Parts I and II of Vol. I to the press, the following species have been collected from the province, but it was too late to incorporate the descriptions in their proper places. It is however proposed to publish their descriptions as an 'addendum' later on.

PART I.

<i>Species.</i>	<i>Natural Order.</i>
1. <i>Ranunculus lætus</i> Wall.	Ranunculaceæ.
2. <i>Dillenia parviflora</i> Griff.	Dilleniaceæ.
3. <i>Magnolia obovata</i> Hast.	Magnoliaceæ.
4. <i>Polyalthia obliqua</i> Hk. f. & T.	Anonaceæ.
5. <i>Cocculus villosa</i> DC.	Menispermaceæ.
6. <i>Gynandropsis speciosa</i> Halter.	Capparidaceæ.
7. <i>Homalium ciliatum</i> Debb.	Flacourtiaceæ.
8. <i>Polygala persicariæifolia</i> DC.	Polygalaceæ.
9. " <i>erioptera</i> DC.	"
10. <i>Salomonina cantoniensis</i> Lour.	"
11. <i>Garcinia ovalifolia</i> Hk. f.	Guttiferæ.
12. " <i>Mangostana</i> Linn.	"
13. <i>Gordonia dipterosperma</i> Kurz.	Ternstroëmiaceæ.
14. <i>Sida acuta</i> Burm.	Malvaceæ.
15. <i>Abutilon striatum</i> Dick.	"
16. <i>Hibiscus subdrifa</i> Linn.	"
17. <i>Pterospermum cinnamomum</i> Kurz.	Sterculiaceæ.
18. <i>Echinocarpus murex</i> Benth.	Tiliaceæ.

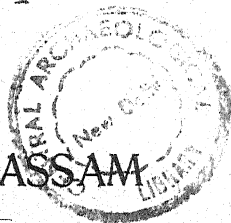
PART II.

<i>Species.</i>	<i>Natural Order.</i>
1. <i>Hiptage bengalensis Kurz.</i>	Malpighiaceæ.
2. <i>Boenninghausenia albiflora Rechb.</i>	Rutaceæ.
3. <i>Canarium sikkimensis, King.</i>	Burseraceæ.
4. <i>Walsura piscidia Roxb.</i>	Meliaceæ.
5. <i>Amoora spectabilis Miq.</i>	"
6. <i>Dysoxylum khasianum Brace.</i>	"
7. <i>Platea latifolia Blume.</i>	Olacaceæ.
8. <i>Euonymus glaber Roxb.</i>	Celastraceæ.
9. " <i>echinatus Wall.</i>	"
10. " <i>Griffithii Kurz.</i>	"
11. " <i>pendulus Wall.</i>	"
12. <i>Kokoona littoralis Laws.</i>	"
13. <i>Celastrus Championii Benth.</i>	"
14. " <i>Hookerii Prain.</i>	"
15. <i>Salacia membranacea Laws.</i>	"
16. <i>Vitis himalayana Brand</i>	Vitaceæ.
17. " <i>tuberculata Laws.</i>	"
18. " <i>bifurcata Wall.</i>	"
19. <i>Leea sundaica Miq.</i>	"
20. <i>Cupania khasiana R.</i>	Sapindaceæ.

Shillong,

C. PURKAYASTHA

10th October, 1936.



FLORA OF ASSAM

DISCIFLORÆ.

FAM. 27. LINACEÆ.

Herbs, shrubs or infrequently trees. *Leaves* alternate, simple; stipules lateral, intrapetiolar or 0. *Flowers* regular, bisexual, often 2 or more-morphic. *Sepals* 5 (or 4), free or connate at the base, imbricate. *Petals* 5 or (4), hypogynous or slightly perigynous, imbricate, often contorted, usually fugacious. *Stamens* 1-2 (or sometimes 3) times as many as the petals, occasionally with staminodes united at the base into a ring or short tube; filaments inserted on or near the apex of the tube; anthers versatile. *Disk* of 5 glands-sometimes two-lobed, united to the staminal tube or 0. *Ovary* free, 3-5 celled; ovules 1-2 in each cell, pendulous; styles 3-5, free or connate; stigmas usually terminal. *Fruit* a septicidal capsule, often splitting into cocci or a drupe.

Fruit capsular:—

Calyx glabrous:—

Undershrub; Stamens 5; staminodes 5.

Small tree; stamens 10.

Calyx with gland tipped bristles.

Fruit a drupe; stamens 10.

.. 1. Reinwardtia.

.. 2. Ixonanthes.

.. 3. Anisadenia.

.. 3. Erythroxylon.

1. REINWARDTIA Dumort.

Reinwardtia trigyna Planch (incl. *R. tetragyna* Planch). Vern. *Puinli-phul*, Beng., Nep.; *Tin-wa-lei*, *Syntew-lang-ksir*, Kh.

A glabrous undershrub about 3-4 ft. high often with rooting branches. *Leaves* 1-5 by 4-1.5 in., oblanceolate or narrow oblong-lanceolate, usually mucronate, entire or with few minute teeth; lateral nerves fine, variable, usually 5-9 on either half, uppermost pair converging to the apex, membranous; base narrowed and decurrent into slender or ordinary short petiole; stipules minute, caducous. *Flowers* 1-2 in. across, bright golden yellow, solitary, often on short branchlets or in axillary or terminal cymes; pedicels up to 1 in. long. *Sepals* 5, persistent, lanceolate, 4-5 in. long. *Petals* 5, 1-1.5 in. long, obovate, somewhat abruptly narrowed towards the base; stamens 5, included, alternating with as many staminodes, longer than the styles in some flowers and shorter than them in others. *Disk* glands 2-3.

Styles 3, sometimes 4-5 (*R. tetragyna*), more or less connate at the base. *Capsule* globose with thin papery walls, .25 in. across.

Foot of NAGA HILLS in LAKHIMPUR & SIBSAGAR and probably in similar localities elsewhere; KHASI & JAINTIA HILLS ascending to about 6000 ft., sometimes cultivated in gardens. Sometimes gregarious and very showy with its golden yellow flowers.

Flrs. Autumn and winter.

2. IXONANTHES Jack.

Ixonanthes khasiana Hk. f. Vern. *Theibar*, Tipp.; *Selbal*, Garo; *ching-buphai*, Kuki.

A moderate to fairly large glabrous tree attaining 120 ft. in height and over 30 in. in diameter in favourable localities, fluted at the base. *Bark* thin, greyish, rough outside; dark red inside with very fine lines of lighter tissue. *Leaves* 3-6 by 1.2-2.4 in., elliptic-lanceolate to oblong, obtusely acuminate, entire, membranous; secondary nerves about 6-9 on either half with many intermediate nerves of equal thickness, lower oblique, upper arcuate; base narrowed and decurrent into a short petiole. *Flowers* about .2 in. across, in. long peduncled, axillary, cyme-bearing panicles; peduncles 1.5-3.5 in. long, more or less flattened and obscurely winged; bracts and bracteoles minute, acute; pedicels .08-.15 in. long. *Sepals* usually 5, shortly connate at the base; persistent, oblong-ovate. *Petals* 5, perigynous, suborbicular-contorted, persistent, enlarged and hardened round the fruit. *Stamens* 10, inserted outside the perigynous annular disk. *Ovary* free, 5-celled; style simple. *Capsule* 5 valved, oblong, pointed at the apex, about 1.5 in. long. *Seeds* winged at the top, about 1 in. long including the wing; wing .15-.2 in. broad, obliquely oblong.

SYLHET, GARO HILLS, and CACHAR.

Wood light brown, even grained, traversed by numerous wavy concentric but discontinuous bands of soft tissue, medullary rays very fine. Takes a fine polish and ornamental in appearance, should prove suitable for cabinet work.

Leaves dry reddish brown.

Flrs. 4. Fr. 12?

ANISADENIA Wall.

Perennial herbs or undershrubs. *Leaves* alternate or somewhat whorled at the top of the stem; stipules intrapetiolar, striate. *Flowers* in terminal spicate racemes; bracts minute, concave, caducous; pedicels short, ultimately reflexed. *Sepals* 5, lanceolate with gland tipped bristles outside. *Petals* 5, contorted, fugacious. *Stamens* 5, hypogynous, connate below, alternating with interposed staminodes. *Glands* 3, one very large. *Ovary* 3 celled; styles 3. *Capsule* oblong, membranous, 1 seeded.

A. saxatilis Wall.—An undershrub or perennial herb, with weak ascending stems upto 18 in. high; lower part often creeping and rooting. *Leaves* 2-4 by .8-1.2 in., lanceolate to oblanceolate or elliptic lanceolate, shortly acuminate, or acute, entire or nearly so, glabrous above, sparingly pubescent and pale beneath; petiole upto .7 in. *Racemes* 2-5 in. long. *Flowers* .3-.25 in. across, pink; pedicels minute.

KHASI HILLS, 4-6000 ft.

Flrs. 7-8. Fr. 10-11.

A. pubescens Griff.—A perennial herb often gregarious in patches, more slender in habit than the preceding. *Leaves* 1-1.5 by .5-.8 in. long, elliptic to lanceolate, acute or shortly acuminate; base acute to cuneate, undersurface pubescent or villous with adpressed silky hairs. *Flowers* about .5 in. long, white, much larger than in *A. sexatilis*.

KHASI HILLS, 5-6000 ft.

Flrs. 7-8. Fr. 10-11.

3. ERYTHROXYLON Linn.

Erythroxylon Kunthianum Wall, Vern. *Dieng-pyllengtham*, *Dieng-pain-khar*, Kh.; *Dieng-juwat*, *Dieng-sugsi*, Synt.

A shrub or a small tree; branchlets lenticellate, younger shoots reddish. *Bark* greyish; rough, thin, inside reddish with white streaks which turn brown on exposure. *Leaves* 1.3-3 by .6-1 in., oblong to elliptic lanceolate or obovate-lanceolate, subacute or bluntly acuminate, rarely rounded at the apex, entire, chartaceous, glabrous above, glaucous beneath, red when young; midrib prominent; lateral nerves fine and rather indistinct, similar to intermediate nerves, looping at a short distance from the margin; base narrowed; petiole .1-1.5 in. long, usually red; stipules intrapetiolar, subulate, setulose on the margin. *Flowers* white, .15 in. across, solitary, axillary, often 1-sexual; pedicels slender, thickened upwards, about .3 in. long. *Sepals* 5, ovate acuminate, free nearly to the base. *Petals* 5, up to .15 in. long, elliptic-oblong with a 2-fid white ligulate appendage near the base. *Stamens* 10, unequal, usually alternately short; filaments dilated towards the base and united into a tube half way down, free end puberulous. *Ovary* 3-celled; styles 3. *Fruit* a ventrally curved, 3-gonous, more or less erect, glabrous, shining, drupe .5 by .25 in., seated on the persistent calyx, red when ripe.

KHASI and JAINTIA HILLS 3000-5500 ft.

The bark is said to be used for chewing with *pan*. Wood light brown, hard, takes a beautiful polish. pores mostly in radial strings joined by numerous very fine transverse lines.

Flrs. 4. Fr. 9.

FAM. 28. MALPIGHIACEÆ.

(Indian genera).

Usually scandent shrubs. *Leaves* opposite, simple, entire, usually exstipulate. *Flowers* regular or irregular, bisexual, 5-merous, white or yellow in axillary or terminal panicles; pedicels articulate, bracteate. *Calyx* deeply 5-partite, in some genera with a gland outside. *Petals* 5, free. *Disk* obscure. *Stamens* 10, hypogynous,

equal or unequal; filaments free or connate below. *Ovary* free, 3-celled, 3-lobed; cells 1-ovuled; styles 1-3. *Fruit* of 1-3 samaras. *Seeds* exalbuminous.

Flowers irregular; calyx glandular; style 1; carpels winged only at the apex.

.. 1. *Hiptage*.

Flowers regular; calyx glandular; styles 3; carpels surrounded by a continuous wing.

.. 2. *Aspidopterys*.

1. HIPTAGE Gærtn.

Climbing shrubs or rarely small trees. *Leaves* opposite, coriaceous, entire, sometimes with intramarginal glands, exstipulate. *Flowers* in simple racemes or leafy panicles, irregular. *Calyx* 5-partite with one large gland outside, partly on the pedicel. *Petals* 5, one differently coloured, unequal, clawed, silky. *Stamens* 10, declinate, one much larger than the others; filaments connate at the base. *Ovary* 3-lobed; styles 1-2, at first coiled; stigma capitate. *Fruit* of 1-3, 3-winged samaras. *Seeds* globose, cotyledons unequal.

Leaves usually acute; shortly acuminate.

Terminal racemes paniced and usually exceeding the leaves.

.. 1. *H. Madablota*.

Leaves usually caudate acuminate.

Racemes much smaller than the leaves

.. 2. *H. acuminata*.

1. *Hiptage Madablota* Gærtn. Vern. *Madhabilata*, Sans., Beng. and Manip.; *Basanti*, Beng.; *Kerek-lata*, Ass.; *Dim-tri-rang-rikang*, Mik.; *Dugrak*, *Dugrak-budu*, Garo.; *Meishein*, Khasi.

A large evergreen scandent shrub; young shoots more or less pubescent; branches dark brown or black, covered with numerous round lenticels. *Leaves* 4-6 by 1.5-2.5 in., oblong or ovate-lanceolate, acuminate, coriaceous, glabrous, dark-green, shining above, reddish-brown when very young, turning yellow before falling; main lateral nerves 4-6 on either half, arcuate; base acute, rarely rounded; petiole .2-.5 in. long, channelled above. *Flowers* .6-.8 in. diam., more or less scented, in large terminal and smaller axillary leafy panicles or racemes; pedicels .5-.7 in. long, bracteate at the base and with 2 setaceous bracteoles about the middle where they are joined. *Calyx* with a large oblong gland outside; segments .25 in. long, imbricate, silky pubescent. *Petals* .4-.6 in. long, unequal, obovate, clawed, fimbriate, 4 white, the 5th wholly or partly pale-yellow. *Stamens* 10, declinate, one much larger than the rest; filaments shortly connate at the base. *Style* 5, filiform. *Carpels* pubescent; wings 3, oblong-obovate or oblanceolate, sometimes deeply notched at the broad apex, the largest up to 2 by .4 in. *Seeds* globose.

Throughout ASSAM ascending to 2500 ft. in K. & J. HILLS.

Flrs. 1-3, sometimes 11? Fr. 4.

2. *Hiptage acuminata* Wall. Vern. *Jeremai-soh-pad-purao*, Kh.

A spreading bush or a strong climber (?), branchlets pubescent when young, very rugose. *Leaves* 3-7.5 by 1.2-2.5 in., lanceolate, usually caudate-acuminate; lateral nerves 4-7 on either half, oblique to arcuate, tertiaries subparallel, strong, sometimes with remote, deeply impressed glands or points or finely reticulate intramarginal nervules; base narrowed obtuse or rounded; petiole .2-.3 in. long, stout, pubescent when young. *Racemes* rusty tomentose, axillary, about 1-2 in. long; pedicels .7-1 in. long, bracteate, with a pair of subulate bracteoles half way up. *Flowers* about .7 in. across; stamens much shorter than the style; samaras generally 3-winged, wings unequal 1-2.5 by .3-.6 in., rather membranous, faintly longitudinally nerved.

MANIPUR, Watt! NAGA HILLS, KHASI HILLS up to 4500 ft.-Lyngkerdem, Cherra-Collet! ASSAM-Jenkins.
Flrs. 5-5. Fr. 5-7.

The habit is generally said to be that of a spreading bush but one of my specimens sheet 6198 is from a strong climber.

2. ASPIDOPTERYS A. Juss.

Climbing shrubs. *Leaves* entire; stipules small or 0. *Flowers* small, inodorous, in panicles or fascicles; peduncles bracteate; pedicels slender, articulate, often 2 bracteolate. *Sepals* 5, short, eglandular. *Petals* 5, entire. *Stamens* 10; filaments free or connate at the base; anthers ovate. *Ovary* 3-locular; styles 3. *Fruit* of 1-3 samaras, with a shield-like membranous wing round the nucleus. *Seeds* oblong, cotyledons straight, equal.

I. Leaves nearly glabrous or glabrous, samara hairless:—

Samaras narrowly ovate or oblong, more or less narrowed at the apex, nucleus not crested between the wings.

.. 1. *A. glabriuscula*.

Samaras orbicular, often broader than long, nucleus crested in the concavity of the wings.

.. 2. *A. elliptica*.

II. Leaves silky pubescent or tomentose beneath; wings of samara more or less hairy, elliptic ovate.

.. 3. *A. nutans*.

1. *Aspidopterys glabriuscula* (Wall) A. Juss. Incl. *A. Roxburghiana* F. B. I. Vern. *Mei-thit*, Khasi.

A woody climber; young parts pubescent but soon glabrescent; stem grey-brown. *Leaves* 2-4 by 1.2-2 in., elliptic or elliptic-lanceolate to ovate, shortly and somewhat abruptly acuminate, rounded or cordate at the base, quite entire, membranous or thinly chartaceous, glabrous above, sparsely pubescent along the midrib and nerves beneath; lateral nerves 4-7 on either half, arcuate, the lowest pair subbasal; petiole .3-.7 in. long, channelled. *Flowers* in terminal and axillary, lax, rusty pubescent panicles, panicle branches usually verticillate; pedicels subumbellately crowded or racemed on the ultimate branches of the panicles

filiform, jointed below the middle, pubescent throughout or glabrescent. *Calyx-lobes* 5, up to .1 in. long, obovate oblong to elliptic, pubescent or glabrescent. *Petals* 5, .15-.25 in. long, obovate-oblong, oblong-elliptic or ovate, rounded at the apex, ultimately reflexed. *Stamens* 10, all fertile; filaments filiform, jointed a little below the middle. *Ovary* 3-celled, pilose or glabrescent. *Samaras* 1-3, nucleus not crested, wing 1.1-1.5 by .4-.6 in., continuous, peltate, ovate-oblong to ovate-lanceolate or oblong, narrowed upwards and rounded or sometimes truncate at the apex, membranous, finely veined, translucent, glabrous.

SIBSAGAR, LAKHIMPUR, DARRANG, GOALPARA. N. CACHAR HILLS. SYLHET, KHASI & JAINTIA HILLS up to 1000 ft., chiefly in scrub forests and old village sites, probably all over the province.

Flrs. 5-7. Fr. 11-1.

Niendenzu in Das Pflanzenreich distinguishes the following varieties:—

Var. 1. *subrotunda*; *A. Henryi* Hutchinson. Leaves broadly ovate to orbicular ovate, shortly but sharply acuminate, sometimes tomentose beneath; style glabrous. *Samaras* elongate oblong.

ASSAM—Masters! Jenkins!

Var. 2. *brevicuspis*; *A. floribunda* Hutchinson. Leaves mostly obovate to oval, very shortly acuminate. *Ovary* glabrous or more or less puberulous; *samaras* oblong to oblong lanceolate.

Tharia—KHASI HILLS. *Simmons*! *Clarke*! CACHAR, *Keenan*!

Var. 3. *longicuspis*.—Leaves ovate-lanceolate to lanceolate, rather long acuminate. *Ovary* glabrous to more or less puberulous.

KHASI HILLS, up to 5000 ft.

2. *Aspidopterys elliptica* A. Juss? Vern. *Ka-chali*, Kh.

A large woody climber with greysih lenticellate branches; young parts and inflorescence thinly adpressed pubescent but soon becoming glabrous. *Leaves* 4-6 in. by 2-3.5 in., broadly elliptic or ovate-lanceolate, shortly and often somewhat abruptly blunt acuminate, chartaceous; lateral nerves 5-6 on either side, arcuate; petiole .4-.8 in. long. *Flowers* white, panicles lax, terminal and axillary, usually with corymbose or subumbellate branches; pedicels filiform, up to .8 in. long, umbelled or subumbellately corymbose on slender peduncles, jointed below the middle. *Sepals* up to about .1 in. long, ovate to oblong, margins ciliolate, thin. *Petals* .2-.25 in. long, ovate oblong, rounded at the apex; *ovary* glabrous. *Samaras* 1.5-2.5 in. across, orbicular, sometimes broader than long, often emarginate at the apex with a crest .9-1.2 in. long and up to about .3 in. broad on the nucleus, nerves prominent ending in submarginal loops.

KHASI HILLS—Nongpoh about 2000 ft., N. CACHAR HILLS—Borail Reserve, about 700 ft.

The bark is said to be chewed with *pan* in the Khasi Hills.

Flrs. 5-6. Fr. 12.

The description applies to Assam Herbarium Sheets Nos. 9783, 4005 and 5695. These agree with the sheets identified as *A. elliptica* at Kew with the exception of the fruit which is larger in our specimens.

3. *Aspidopterys nutans* Hk. f., non *A. nutans* (Wall) A. Juss.; *A. lanuginosa* Wall (A. Juss). Vern. *Dusismmak*, Garo; *Jarmatodong-khmai*, Khasi.

A woody climber; young shoots and inflorescence adpressed grey or brownish silky tomentose. *Leaves* 4-10 in. long, broad

ovate or suborbicular, shortly acuminate; lateral nerves about 6 pairs, arcuate, adpressed-pubescent on the nerves beneath, rather thinly in the intermediate spaces and on the upper surface; petiole .75 to 2 in. long, puberulous. *Panicles* lax; pedicels .5-.7 in. long, jointed about or below the middle, glabrous above the articulation. *Sepals* obtuse, .05 in., glabrous or glabrescent. *Petals* oblong to elliptic. *Ovary* villous. *Wings* of samara elliptic ovate, reticulate, somewhat narrowed and often with a shallow notch towards the apex, adpressed pubescent on both sides round the nucleus, sparsely elsewhere, reticulate, membranous, translucent, 1.2-1.5 by .7-1.2 in.

DARRANG, GOALPARA, GARO HILLS, KAMRUP. KHASI & JAINTHIA HILLS ascending to 2000 ft.

Flrs. rainy season. Fr. 10.

A. lanuginosa (Wall) A. Juss. should probably take priority over Hooker's name, but I have retained it on account of its being better known to Foresters.

Aspidopterys oxyphylla A. Juss.—A rather imperfectly known woody climber. *Leaves* 3-4 in. long, ovate or elliptic ovate, acuminate, pubescent beneath. *Panicles* tomentose. *Flowers* small, white. *Samara* with orbicular wings not crested above the nucleus.

KHASI HILLS up to 3000 ft. Mahadeo, *Clarke!* Tharia, Wallich etc., SYLHET Wallich-No. 7264.

These sheets are in flower and had been included by Hooker under *A. Roxburghiana* A. Juss., the fruit not being known to him. Hutchinson in his revision of the Indian species of the genus (Kew Bulletin, 1917) has shown that the plant has orbicular fruits—quite different to that of the plant grouped by Hooker under this name.

Aspidopterys sp. near *A. oxyphylla* A. Juss.—A climber with glabrous or nearly glabrous branchlets. *Leaves* 4-7 by 1-2.2 in., lanceolate, acuminate, chartaceous, glabrous or slightly puberulous on the nerves beneath; lateral nerves 4-5 on either half, tertiaries subparallel; base narrowed. *Panicles* terminal or axillary, pubescent, the latter shorter than the leaves. *Bracts* leafy, upper small, grading into leaves; bracteoles minute, concave, acute; panicle branches opposite or whorled. *Panicles* racemed; pedicels articulated about the middle, glabrous in fruit, up to .6 in. long. *Flowers* not seen. *Samara* about 1 by .5-.6 in., ovate-elliptic to suborbicular elliptic, membranous, larger nerves ending in submarginal loops, nucleus not crested.

Kanjilal sheet No. 4822, KHASI HILLS—Mahadeo, 3000 ft., does not match with any named sheets at Calcutta or Dehra. The leaves match with sheets of *A. oxyphylla* in Wallich's Catalogue in Kew Herbarium. But as the Wallichian sheet is not in fruit, the plant has been tentatively separated till it can be studied with more complete material.

Fr. 10.

FAM. 29. OXALIDACEÆ.

(Engler and Prantl III. 4.15)

Generally herbs or undershrubs, rarely trees. *Leaves* alternate, compound. *Flowers* regular. *Sepals* 5, imbricate. *Petals* 5, generally contorted in bud. *Stamens* 10, of which 5 are sometimes reduced to staminodes. *Ovary* 5-celled; styles 5, distinct. *Fruit* a loculicidal capsule or a 5-lobed berry.

AVERRHOA Linn.

Averrhoa Carambola Linn. Vern. *Kordoi*, Ass.; *Kamaranga*, Beng.; *Heinohjom*, Manip.; *Amrenga*, Garo; *Thei-rhei-ol*, Kuki; *Dieng-soh-treng*, Khasi.

A small tree up to 35 ft. in height; stem irregularly fluted. *Bark* rough, dark-grey with horizontal wrinkles outside, very finely fibrous in thin layers, uniformly light reddish inside. *Leaves* imparipinnate, 4-10 in. long, exstipulate; leaflets 5-11, subopposite, 1-3 by 6-1.5 in., ovate, rhomboid or lanceolate, unequal sided, the lateral nerves gradually smaller upward, acuminate, acute at the base, entire, membranous, glabrous above, glaucous and pubescent along the midrib and nerves beneath; petiolules about 1 in. long, pubescent. *Flowers* small, variegated, white and purple, in short axillary and terminal panicles. *Calyx* glabrous, lobes 5, about 1 in. long. *Petals* 5, about .25 in. long, twisted. *Stamens* 10, 3-5 usually shorter and antherless. *Ovary* 5 ridged, sparsely pubescent. *Fruit* 3 in. long, oblong in outline, sharply 3-5-angled; *Seeds* many, arillate.

Cultivated in villages in most districts up to 2000 ft. for the fruits. Occasionally found as an escape. Two varieties with sweet and sour fruits are known.

The wood is reddish and fine grained suitable for scantlings for buildings. Twigs of the tree are kept in houses with the belief that they keep off measles.

Firs, 8-9. Fr. 11-1.

FAM. 30. *RUTACEÆ*.

Trees or shrubs, usually aromatic. *Leaves* usually alternate, generally compound, exstipulate; leaflets usually with numerous translucent dots. *Flowers* regular, 2-sexual, sometimes polygamous, in simple or paniced cymes or corymbs. *Disk* annular, more or less lobed. *Calyx* of 4-5 imbricate segments, often connate below. *Petals* ordinarily as many as the calyx-segments, usually hypogynous, imbricate or valvate. *Stamens* as many or twice as many as the petals; sometimes many; anthers 2-celled, often versatile. *Ovary* usually of 4-5, rarely more, free or connate carpels; styles 1-5, free or sometimes united. *Fruit* baccate and large, or of 1-4 indehiscent or capsular cocci, less frequently drupaceous. *Seeds* various; radicle superior.

I. Flowers usually polygamous, ovules 1-2 in each cell:—

A. Ovary deeply lobed; styles free, fruit of capsular cocci:—

Leaves opposite. Unarmed trees. ..
Leaves alternate. Armed, erect or
scandent trees or shrubs. ..

.. 1. *Evodia*.

.. 2. *Zanthoxylum*.

- B. Ovary entire or slightly 2-5 lobed, styles united, fruit baccate or drupaceous :—
1. Stem prickly ; scandent shrub :—
Leaves alternate, digitately trifoliolate. ..
 2. Unarmed erect shrubs or small trees :—
Leaves 1-foliolate opposite ; petals 4 ; stamens 8. ..
Leaves simple, alternate, petals and stamens each 4-5. ...
- .. 3. *Toddalia*
- .. 4. *Acronychia*.
- .. 5. *Skimmia*.
- II Flowers usually 2-sexual ; * Ovary entire, style combined, fruit baccate :—
- A. Ovules 1-2 in each cell :—
1. Unarmed :—
 - a. Leaves 1-5, rarely 7-foliolate ; petals imbricate ; style persistent. ..
 - b. Leaves imparipinnate, style deciduous, usually jointed to the top of the ovary :—
Petals imbricate ; filaments dilated below the subulate tip. ..
Petals imbricate, filaments subulate (not dilated), ovary linear 2-celled ; cotyledons fleshy planoconvex. ..
Petals valvate, filaments subulate, ovary 4-5 celled ; cotyledons leafy ; crumpled. ..
 2. Mostly armed ; pericarp leathery :—
 - a. Leaves 3-foliolate :—
Flowers 4-5-merous ; leaflets coriaceous, entire ; scandent shrub. ...
 - b. Leaves 1-foliolate :—
Erect ; flowers small, fascicled or shortly racemose ; disk annular or cupular. ..
Often scandent, flowers large, about 1 in. across, solitary or fascicled, disk columnar. ..
- .. 6. *Glycosmis*.
- .. 7. *Clausena*.
- .. 8. *Murraya*.
- .. 9. *Micromelum*.
- .. 10. *Luvunga*.
- .. 11. *Atalantia*.
- .. 12. *Paramignya*.
- B. Ovules many in each cell, stamens 10 or more :—
- Leaves 1-foliolate ; pericarp leathery... .. 13. *Citrus*.
 - Leaves 3-foliolate ; pericarp woody. .. 14. *Ægle*

31. EVODIA Forst.

Evergreen trees or shrubs, unarmed. *Leaves* opposite, simple. 1-3 foliolate or imparipinnate ; leaflets punctate, usually quite entire. *Flowers* small, 1-sexual, in axillary or terminal panicles ; peduncles generally flattened. *Sepals* 4-5, imbricate. *Petals* 4-5, valvate or slightly imbricate. *Stamens* 4-5, inserted at the base of the disk ; filaments subulate, anthers oblong. *Ovary* 4-celled, deeply 4-lobed ; ovules 2 in each cell ; stigma 4-lobed. *Fruit* of 4 coriaceous, 2-valved, generally 1-2 seeded, dehiscent cocci ;

* Flowers often polygamous in *Citrus medica*.

endocarp horny. *Seeds* globose or oblong; testa blackish, horny, shining; hilum linear, often extending along the entire length of the seed; albumen and cotyledons oily.

Leaves 3-foliolate :—

Small tree; branchlets puberulous when young, inflorescence equalling or exceeding the petioles.

.. 1. *E. Roxburghiana*.

Shrub; branchlets glabrous; inflorescence much shorter than the petioles.

.. 2. *E. triphylla*.

Leaves imparipinnate :—

Leaflets usually entire and pubescent or puberulous; seeds rounded :—

Large tree; leaves aromatic, pedicels and panicle branches slender, spreading; bracts small, deciduous; capsule slightly rugose outside.

.. 3. *E. meliæfolia*.

Small tree; leaves inodorous; pedicels and panicle branches stout, compact, bracts large, persistent; capsule very rugose outside.

.. 4. *E. rutæcarpa*.

Leaflets usually crenulate* glabrous or glabrate, nervules distinct; bracts minute; capsule dotted; seeds compressed at the angles

.. 5. *E. fraxinifolia*.

1. *Evodia Roxburghiana* Benth. Vern. *Midauma-baphang*, Cach.

A tree up to 50 ft. in height and nearly 4ft. in girth with opposite branches; tender parts and inflorescence puberulous. Bark corky and greyish white outside, slightly reticulately fissured; inside greenish white with a touch of red, fibrous, 2·3 in. thick. *Leaves* 3-foliolate; pet. 2·6 in. long, terete. *Leaflets* 4·8 by 2·2-4·5 in., elliptic, obovate or oblong, generally acuminate, narrowed at the base, membranous, bluish green, glabrous and shining above, with close amber-coloured pellucid dots; puberulous or glabrescent beneath along the nerves; midrib impressed above, prominent beneath; lateral nerves 12-18 on either half, slender, almost horizontal at the base and slightly arched upwards; petioles 1·1-1·5 in. long. *Flowers* dioecious, small, generally 4-merous, bracteate, in dense umbellate cymes, which are arranged in axillary or terminal panicles with spreading opposite and flattened ramifications; pedicels short, panicles as long as or exceeding the petioles. *Calyx* very small; lobes rounded with ciliate margins. *Petals* whitish, about 1 in. long, ovate oblong. *Male flowers*—Stamens 4; filaments glabrous; disk pubescent. *Female flowers*.—Ovary pubescent; style short, thick; stigma obsoletely 4-lobed; staminodes 4. *Cocci* 4, 2-valved, globose; endocarp crustaceous; seeds black, hard, shining, 1 or 2 in each coccus, globose if single, faceted if in pairs (as in my No. 6519).

SIBSAGAR DISTRICT, between Nichugard and Garampani; N. LAKHIM PUR near Gagaldhubi, NOWGONG—Dhansiri reserve, KHASI & JAINTHIA HILLS, Raliang, up to 4000 ft.

* Assam form.

Wood greyish-white, even-grained; weighing 55-40 lbs per c. ft.; pores scattered in small groups in zig-zag lines, medullary rays very fine.
Flrs. 8-9. Fr. 12-1.

2. *Evodia triphylla* DC.

A shrub; young parts, common petiole, petiolules and midrib dotted with minute reddish or yellowish glands. *Leaves* aromatic, opposite, usually 3-foliate; common petiole 3-5 in. long, slender, slightly margined towards the top. *Leaflets* 3.5-7.5 by 1.5-2.3 in., terminal usually largest, lanceolate oblong-elliptic or oblong-lanceolate, acuminate, entire, membranous, puberulous along the margins when very young, perfectly glabrous afterwards; lateral nerves 12-16, prominent beneath, looping near the margin and forming a continuous intramarginal nerve; base usually oblique, acute and continued into the short petiolule. *Panicles* small, much shorter than the common petiolule. *Flowers* small, on slender pedicels. *Petals* 4; filaments glabrous. *Ovary* puberulous, 4-celled. *Cocci* usually 4, dotted.

NORTH CACHAR HILLS—above Jatinga, 2400 ft.
Flrs. 2-3.

3. *Evodia meliaefolia* Benth. Vern. *Maiphak*, Ass, Namsing-asing, Muka-asing, Abor; *Bora-asing*, Miri; *Theng-hanjan*, Pag-rak (?), Mik.; *Machli-poma*, Sylh.; *Dieng-si-ing*, Khasi (Shella); *Dieng-saw-ngiang-jerep*, Khasi (Tharia); *Dieng-soh-tong-klong*, Synt.

A tree up to 85 ft. in height and nearly 8 ft. in girth, rather variable in most of its characters; branchlets generally slender, lenticellate. *Bark* greenish white, nearly smooth but covered with large lenticels; inside uniformly pale or dun-yellow, soon turning to chocolate colour, fibrous, 2.5 in. thick, somewhat mucilaginous. *Leaves* imparipinnate; rachis often with a sharp ridge above, otherwise terete, pubescent or glabrescent. *Leaflets* usually 9-15, sometimes as few as 3 only, opposite, 3-6 by 7-2 in., lanceolate, ovate or oblong-lanceolate, more or less unequal sided except the terminal one, long-acuminate, quite entire, thinly chartaceous, glabrous and shining above, glaucous beneath; midrib prominent underneath, generally pubescent or puberulous, rarely glabrate on both surfaces, usually aromatic, turning yellow before falling; lateral nerves 10-15 on either half, slender, arched; tertiaries very finely reticulate; base abruptly narrowed to the petiolule; lateral petiolules 1.6 in. long, terminal, 6-1.2 in. long. *Flowers* very small, generally 5-merous, in umbellate pubescent cymes arranged in terminal and axillary brachiate panicles, 5-8 in. long. *Sepals* minute, obtuse. *Petals* hairy within. *Cocci* generally 5, usually 1-seeded; seeds black, globose, hard, shining.

Occurs sporadically in all the DISTRICTS ascending to about 1000 ft.

Wood light yellowish white or grey turning light brown, even-grained, not liable to warp or split; pores moderate sized to large; medullary rays rather broad and continuous. It is much used for shingles by planters and for looms by the Assamese. Little or not attacked by white ants.

Flrs. 4-7. Fr. 11-1.

4. *Evodia rutæcarpa* Hk. f. & Thom. Vern. *Bora-asing*, Miri; *Muka-asing*, Abor.

A shrub or a small tree about 30 ft. in height clothed with velvety pubescence. *Leaves* imparipinnate, 12-18 in. long; rachis nearly terete, velvety; leaflets 3-5 pairs, usually inodorous, 2.5-6.2 by 1-2 in., lanceolate or oblanceolate, acuminate, entire, lateral nerves up to 10-15 on either half, more densely hairy on the undersurface; base unequal, usually narrowed to the very short petiole. *Flowers* 4-5 merous, small in brachiate cymes; peduncles of cymes and panicle branches stout; panicles 3-4.5 in. across; bracts up to .4 in. long, persistent. *Petals* pubescent within; filaments hairy, anthers large. *Capsule* .3 in. across, rugose outside, cocci 4.

KHASI HILLS—Rang-kheng-sning at about 5000 ft. and also probably in N. E. FRONTIER between Kobo and Pillang (material insufficient for determination).

Flrs. 7-8? Fr. 9.

5. *Evodia fraxinifolia* Hk. f. Vern. *Dieng-sngiyat*, *Dieng-bora-pram*, Kh., *Dieng-sah-iaru*, *Dieng-sa-tyng-klong*, *Dieng-subu-klong*, Synt.

Small to moderate sized tree. *Bark* brown or light to ashy grey rather smooth but warty with rather large lenticels, yellowish white inside; young shoots pubescent. *Leaves* 8-14 in. long, rachis slightly ridged above; leaflets usually 9-11, sometimes only 5, 3.5-8 by 1.2-3 in., lanceolate or oblong-lanceolate, finely acuminate, usually crenulate with a gland at each sinus, thin, glabrous when mature or puberulous on the midrib above; lateral nerves 12-15 on either side, nervules finely reticulate, distinct; base unequal, usually narrowed and often continued into the short petiole. *Cymes* brachiate, panicles shorter than the leaves, spreading, branches compressed, finely pubescent; bracts minute; pedicels short. *Flowers* greenish-white; sepals small; petals pubescent within, much longer. MALE FLRS.—With 4 rudimentary carpels; filaments somewhat hairy. FEMALE FLRS.—Ovary glabrous. *Capsule* red, cocci usually 4; seeds rather compressed, dark brown.

KHASI & JAINTIA HILLS 3000-5000 ft.

Flrs. 5-6. Fr. 2.

The leaflets are sometimes entire but in all Assam specimens examined by me they are crenulate.

2. *ZANTHOXYLUM* Linn.

(*Fagara* Schreb.)

Trees or shrubs, sometimes scandent, and generally armed with prickles, those on stem and larger branches on a conical corky base. *Leaves* alternate, 3-foliolate or imparipinnate, rarely paripinnate; leaflets opposite or alternate, entire or crenate, punctate, aromatic. *Flowers* small, often 1-sexual, in axillary or terminal peduncled, paniced cymes. *Calyx* 3-8 fid or rarely 0.

Petals 3-5, rarely 0, imbricate or induplicate-valvate. *Disk* small or obscure. *Stamens* 3-5, reduced to scales in female flowers, rudimentary in male flowers, hypogynous. *Ovary* rudimentary in male flrs.; of 1-5 oblique carpels in female flrs.; styles sublateral, free or connate at the apex; ovules 2 in each cell, usually collateral. *Fruit* of 1-5, 1-seeded carpels, which dehisce ventrally, endocarp horny. *Seeds* shining, blue or black; albumen fleshy; cotyledons flat.

I. Leaves imparipinnate :—

A. Trees or erect shrubs :—

1. Rachis not winged; panicle branches opposite; petals present :—

a. Leaflets entire, ovate or ovate-lanceolate, caudate acuminate, rather membranous, pale or glaucous beneath. Flrs. 4-merous. Prickles on old stems somewhat distant, aerial roots 0 ..

.. 1. *Z. Rhetsa*,

b. Leaflets crenulate lanceolate or oblong lanceolate with a prominent gland at each crenature, caudate acuminate, subcoriaceous, green beneath. Flrs. 4-merous, aerial roots 0 ..

... 2. *Z. Budrunga*.

c. Leaflets crenulate, elliptic or oblong, abruptly short acuminate, very coriaceous, pale green beneath. Flrs. 5-merous, aerial roots often present. ..

.. 3. *Z. myriacanthum*.

2. Rachis winged, panicle branches alternate, petals 0 :—

Leaflets entirely glabrous, glossy above. Flowers yellowish, cymes in lax panicles, usually exceeding 1 in. ..

.. 4. *Z. alatum*.

Leaflets puberulous on both surfaces not glossy above. Flrs. purplish; cymes dense, usually under 1 in. long. ..

.. 5. *Z. acanthopodium*.

B. Scandent shrubs, panicle branches alternate; petals present :—

I. Leaflets 3-6 in. long :—

Leaflets 7, all opposite. ..

.. 6. *Z. Hamiltonianum*.

2. Leaflets under 3 in. long, leaflets 7-21 :—

a. Leaflets alternate and opposite crenate. Flowers large, umbelled on the branches of panicles. ..

.. 7. *Z. oxyphyllum*.

b. Leaflets mostly alternate, entire or minutely crenulate. Flowers minute not umbelled. ..

.. 8. *Z. khasianum*.

II. Leaves trifoliate, erect trees, panicle branches alternate. ..

.. 9. *Z. ovalifolium*.

1. *Zanthoxylum Rhetsa* DC. Vern. *Bajarmali*, *Bajarmali*, Ass. *Onger-asing*, *Miri* & *Abor*; *Han-jor*, *Theng-nang-arong*, *Mik*; *Malaphang*, *Thenthe-lau-phang*, *Jingir-phang*, *Cach*; *Jur-thoum-thing*, *Kuki*; *Hechui-ching*, *Naga*; *Bolnicheng*, *Shumi-chheng*, *Garó*, *Dieng-soh-mirik*, *Khasi* (*Isamati*); *Dieng-nadkor*, *Khasi* (*Shella*); *Dieng-soh-aruin*, *Khasi*.

A deciduous tree up to 75 ft. in height and 4-5 ft. in girth, with a large crown, covered with sharp prickles, those on the

branches incurved, and on the trunk with conical corky bases; pith large, septate with thin transverse membranes. *Bark* corky and pale yellow outside; light-brown inside, soon turning dark-chocolate on exposure. *Leaves* paripinnate or imparipinnate, crowded at the ends of the branchlets, 1-2 ft. long; rachis terete, glabrous. *Leaflets* 16-25, opposite, 3-5 by 1-2 in., subfalcately oblong or ovate-lanceolate, very unequal sided, caudate-acuminate, the larger half rounded at the base, the smaller half cuneate and above the base of the other half, quite entire, membranous or thinly coriaceous, glabrous and shining above, glaucous underneath at least when young, turning yellow before falling, very faintly or not at all aromatic; main lateral nerves in the larger half up to 22, in the smaller 2 or 3 fewer, almost straight; pellucid dots extremely minute or invisible; petiolules 15-5 in. long. *Flowers* small, 4-merous, light-green or pale yellow, in large crowded terminal and subterminal puberulous panicles of cymes with opposite branches up to 9 in. long; bracts minute, caducous; pedicels very short; sometimes prickly. *Calyx lobes* minute, triangular, acute. *Petals* 4, elliptic, or elliptic-obovate, valvate. *Anthers* versatile. *Ripe carpels* globose, 2-valved. *Seeds* solitary, globose, 2 in. across, bluish-black, shining.

Sporadic throughout the PROVINCE, but gradually more scarce in the UPPER DISTRICTS ascending to about 2000 ft.

Wood yellowish grey, close grained, moderate hard; pores scanty in the brownish autumn wood; annual rings marked by a thin band of soft tissue of light colour; weight 40 lbs. per c. ft. The cork from the base of the prickles of the trunk is turned into beads and other articles of ornament by the Cacharies and the tender leaves are eaten cooked by the Aitonias. In Southern India the unripe carpels and the seeds are used as condiments. An essential oil is obtained from the fruit, which is used medicinally.

Flrs. with new leaves 3-4. Fr. 11-12.

2. *Zanthoxylum Budrunga* Wall Cat. Vern. *Bajarmuni*, Ass.; *Bazarnali*, Ass. (Kam.); *Bajna*, Ass.; *Buz-ruli*, Mech; *Chingir-phang*, *Bajrang*, Cach., *Tingang-arong*, Mik.; *Ongret*, Naga; *Bajrang*, Sylh.; *Nyngdong*, Manip.; *Sing-i-te*, Kuki; *Sumet-chheng*, Garo; *Dieng-ka-synrang*, Khasi.

An evergreen tree up to 50 ft. in height and 4 ft. in girth, very doubtfully different from the preceding species and very difficult to separate it from herbarium material. *Size* for *size* the trunk is very much more closely studded with prickles which have also larger corky base about (3 by 2 by 2.5 in.), and the branches are fewer and crowded at the top of the tree, the crown being consequently more or less flat-topped. *Bark* grey and finely reticulately fissured outside; green underneath the corky layer, inner layers pale with streaks of purplish tissue, both soon turning deeper on exposure. *Leaves* 1-2.5 ft. long, generally imparipinnate; rachis sometimes armed. *Leaflets* 15-21, opposite, 3-6 by 1-1.5 in., oblong-lanceolate, very oblique, caudate-acuminate, distantly crenulate with a large reddish pellucid dot at each sinus or entire, quite glabrous, aromatic, turning yellow before

falling; main lateral nerves 20-22 up to the base of the acumen in the larger half, 2-3 fewer in the other half; pellucid dots minute or fairly large; petiolules '1-15 in. long. *Flowers* minute, greenish-white in 3-chotomous cymes arranged in crowded terminal panicles; peduncles sometimes armed. *Petals* 4. *Fruit* and seed as in *Z. Rhetsa*.

Throughout the province extending to low foot hills, fairly common in many districts.

Wood close grained, moderately hard, uniformly white, with pores uniformly distributed; annual rings sharply marked by a thin line of soft tissues; weight about 48 lbs. per c. ft. The Kukis prize the wood for house post and the Meches use it for looms. The leaves are known to be edible, the cork of the prickles is used in the same way as of *Z. Rhetsa* and the fruit and seeds have the same economic uses. The Nagas catch fish by poisoning the water with the powder of the seeds.

Flrs. 3-4. Fr. 8-9.

3. *Zanthoxylum myriacanthum* Wall. ? (or nov, sp. ?).

A large evergreen tree up to 70 ft. in height and nearly 5 ft. in girth, often with strong aerial roots; all parts excepting the ramifications of inflorescence perfectly glabrous; branchlets fleshy, covered with slightly incurved sharp prickles. *Bark* grey, with sharp prickles and transversely oblong corky protuberances near the base; dun-yellow inside. *Leaves* paripinnate, 9-14 in. long; rachis armed; peduncle 5-6 in. long. *Leaflets* 6-8 (?), opposite or subopposite, 4-7 by 2-3 in., oblong or elliptic, abruptly short acuminate, slightly oblique but generally unequal-sided at the base, which is rounded on both halves, minutely crenulate, very coriaceous, dark-green and shining above, pale-green and also shining beneath, very aromatic, pellucid dots large—containing fragrant essential oil; main lateral nerves about 18 in larger half, one or two fewer in the smaller half, arched, bifurcating beyond the middle; petiolules '1-6 in. long. *Flowers* 5-merous, very small, bracteolate, crowded in much branched spreading paniced cymes; ramifications of inflorescence patently puberulous; bud globose. *Calyx-lobes* rounded, glabrous. *Petals* 5, orbicular, glabrous, strongly imbricate. *Filaments* short, tapering, glabrous. *Carpels* up to 3 in the female flowers. *Ripe carpels* not seen, but assuming that the tree has been correctly identified, they ought to be, according to the Fl. Br. Ind., '12 in. cross., compressed, apiculate.

Only found in the Dulong Reserve, NORTH LAKHIMPUR.

Wood golden yellow when fresh-cut, afterwards tan-brown; pores large, often in strings of 2-6; medullary rays fairly broad and equidistant showing conspicuous silver-grain on a radical section; annual rings marked by a very thin line of softer tissue. Weight about 32 lbs. per c. ft. It seems to be suitable for tea boxes.

Flrs. 3-4.

4. *Zanthoxylum alatum* Roxb.

A small, strongly aromatic tree attaining about 25ft. or a shrub; young shoots glabrous. *Prickles* straight or incurved from a broad base which is enlarged and becomes woody in old stems.

Bark greyish brown in old trees with corky furrows, twigs grey or greenish grey smooth, but lenticellate. *Blaze* yellowish, turning blackish-brown. *Leaves* imparipinnate, rachis 2-4 in. long, glabrous with foliaceous wings which are broader upwards, jointed at the insertion of leaflets. *Leaflets* 5-11, opposite, 1-4 by 1-1.2 in., lower smaller, narrow to oblong lanceolate, subacute, obtuse or acuminate, glabrous, dark green and shining above, paler beneath, subcoriaceous; lateral nerves 10-16 on either half, bifurcate near the margin, serrulate or subentire, prominently pellucid punctate on each serrature and sparsely elsewhere; base more or less oblique; petiolule 0 or very short. *Flowers* small, yellowish in lax pyramidal pubescent panicles 1-2 in. long, terminating lateral shoots or axillary; pedicels short. *Calyx* 6-8, linear. *Petals* 0. *Stamens* 6-8, in male flowers. *Ripe carpels* 1-2, less often 3, in each fruit, red, size of a pepper-corn, somewhat compressed, tubercled; seeds black, globose, rugose.

KHASI HILLS 2-6000 ft. often in the vicinity of villages where it is sometimes planted in hedges.

The ripe fruits are used as a specific for toothache.

Flrs. 4-6 ? Fr. 10-11.

Differs mainly by its glabrous rachis and leaflets and laxer inflorescence from the next species and is doubtfully specifically different.

5. *Zanthoxylum acanthopodium* DC. Vern. *Jayurikhlan*, *Dieng-soh-mio*, *Soh-jing-buin*, *Dieng-jaior-khlaw*, *Dieng-soh-majur*, *Dieng-soh-khlam*, Khasi; *Jaur*, *Dieng-ja-iaur*, Synt.

A straggly thorny aromatic shrub or small tree; young shoots pubescent or puberulous. *Bark* greenish grey, smooth and lenticellate in young stems; greyish, corky and reticulately fissured when old. *Blaze* greenish; prickles nearly straight or incurved from a broad base, polished and enlarged with woody base in old trees. *Leaves* imparipinnate, rachis 2-4 in. long, puberulous, with foliaceous wings which are gradually broader upwards, jointed at the insertion of leaflets, usually prickly when young; leaflets 5-9, 13 according to some authorities, rarely 3, opposite, 1-4 by 1-1.2 in., smaller downwards, elliptic oblong or ovate, acute, acuminate or subacute at the apex, serrate or serrulate, prominently pellucid-punctate at each serrature, elsewhere glands few, not prominent, pubescent or puberulous along the nerves on both surfaces; lateral nerves 14-19 on either half, bifurcating near the margin; midrib prickly in young leaves; base often oblique; petiolules 0 or very short. *Cymes* often in pairs from leaf axils, dense, about 5 in. long, puberulous. *Flowers* purplish, small; pedicels very short. *Calyx* 6-8 lobed; lobes linear, ciliate. *Stamens* 6-8 in male flowers. *Fruit* forming dense subsessile clusters; ripe carpels 1-3 in each fruit, red; seeds globose, similar to that of last species.

KHASI HILLS up to 6000 ft.

Fruit is said to be used for killing fish.

Fls. 9-10 Fr. 12.

6. Zanthoxylum Hamiltonianum Wall. Vern. *Texmoi*, *Tejmai-bih*. Ass. (common); *Texmuri*. Ass. (Numaligarh); *Bagh-anchora*, Ass.; *Rikam-ruibhi*, Miri; *Changre*, Naga; *Tes-moi*, Mech.

A large evergreen scandent shrub, armed with recurved prickles which, on very old stems have more or less cylindrical and corky bases; young parts pubescent or velvety; pith small, not septate. *Bark* dark-grey outside, cream-coloured inside. *Leaves* imparipinnate, 9-15 in. long; rachis terete, pubescent or glabrous, armed with recurved prickles. *Leaflets* 5-7, the lateral opposite 3-7 by 1·7-3 in., ovate, oblong or elliptic, abruptly or gradually narrowed into a broad emarginate apex, rounded or subacute at the base, scarcely oblique, usually entire, chartaceous, shining on both surfaces, wholly glabrous or pubescent along the midrib beneath, which is sometimes armed with a few recurved prickles, generally with a few large pellucid dots filled with an essential oil; main lateral nerves 10-15 on either side of the midrib, arched, generally looping; petiolules 1-1·5 in. long. *Flowers* about 2 in. across, dull-white, shortly pedicelled, in slender, puberulous axillary fascicled cyme-bearing panicles 1·5-3 in. long. *Calyx lobes* minute, triangular-ovate. *Petals* 4-5, ovate, subimbricate. *Filaments* about 12 in. long, very slender; anthers basifixed. *Fruiting carpels* 2-4, rarely 5, 1·6 in. across, obliquely set, globose, somewhat compressed, pitted outside; seeds pitted, brownish black, very glossy.

Fairly common throughout the province in low level forests except in KHASI AND JAINTIA HILLS.

Wood pale yellow, compact; pores orbicular, rather small for a climber; medullary rays nearly equidistant, somewhat wavy. The fruit is used for poisoning fish.

Fls. 3-4. Fr. 5-6.

7. Zanthoxylum oxyphyllum Edgw. Vern. *Mexenga*, Ass. (Lakh).

At first a slender erect shrub but afterwards scrambling on trees, very aromatic, glabrous, prickles usually hooked; pith large, septate. *Leaves* 6-14 in. long, rachis armed with prickles beneath and with 2 faint longitudinal ridges above. *Leaflets* strongly aromatic, very variable in size and shape, opposite and alternate, 1-3 by 5-1·6 in.; elliptic or lanceolate, often taper-pointed, subcoriaceous, entire, crenate or crenulate with a large translucent gland at each sinus; lateral nerves 10-12 on either side of the midrib; base acute; petiolules 0·5-2 in. long. *Flowers* 4-merous, 1·5-3 in. across, umbelled in much branched panicked axillary cymes; pedicels slender. *Petals* obtuse, imbricate. *Ripe carpels* 2-4, tubercled. *Seeds* 15 in. across, globose, blue-black, shining.

Makum, LAKHIMPUR; near Nazira, SIBSAGAR and in the Charduar Reserve, DARRANG, Adgiri, GARO HILLS (record based on fragmentary material). KHASI HILLS 4-6000 ft. F. B. I.

The tender shoots are eaten cooked as a vegetable.

Fls. 4-5. Fr. 8-9.

8. *Zanthoxylum khasianum* Hk. f. Vern. *Soh-mrit*, *Dieng-tiw-shiah*, *Soh-umiuw*, Kh.

A large aromatic woody climber or straggling shrub; young parts and inflorescence very pubescent. *Bark* thin, rough, grey; prickles recurved. *Leaves* imparipinnate; rachis very variable in length, ordinarily 4-11 in., often with sharp recurved prickles, channelled, at first pubescent, glabrate with age; leaflets very variable 9-19, rarely 21, alternate, subopposite or less often opposite, 1.2-2.2 by .5-.8 in., often oblique, elliptic or oblong-elliptic, apex often subfalcate, bluntly acuminate, generally caudate, minutely crenulate, glandular at crenatures, shining, glabrous or puberulous along the lower half of midrib on either surface; lateral nerves 7-10 on either half; base often unequal, narrowed to the petiolule; petiolules margined, up to .15 in. long. *Flowers* greenish, about .1 in. long, in panicles of cymes up to 2.5 in. long; panicle branches alternate; bracteoles ovate ciliate. *Calyx lobes* 4, ovate-oblong, obtuse, ciliate on the margins, up to .15 in. long. *Petals* obovate, concave. *Stamens* 4 in male flowers. *Carpels* 4 in female flowers. *Drupels* 1-3, slightly compressed, obovoid, of the size of a pepper corn with aromatic, pellucid dots; rugose when dry. *Seeds* globose, shining, black, slightly uneven.

KHASI HILLS 5000-6400 ft.

Sometimes the rachis is very short, 2 in. only with as few as 7 leaflets and totally unarmed.

Flrs. 5. Fr. 9-10 ?

Zanthoxylum sp., Vern. *Kunja-shia-khuat*, Kh.; *Dieng-thinat-syar* (lit. cock's spur) Synt., closely allied to the above, scandent; leaflets up to 41, 6-1 by 3-5. Flrs. and fruit not seen.

KHASI HILLS, Raithkwan, Nong-kersein, Upper Shillong etc.

9. *Zanthoxylum ovalifolium* Wight. Vern. *Dieng-siniath*, *Tew-kalong*, *Dieng-shih*, Kh.

A small aromatic tree or shrub, sometimes unarmed. *Bark* grey or brownish with pale streaks outside, pale yellowish, turning light brown inside, prickles slightly incurved or straight from broad bases, conical on old stems; branches lenticellate, glabrous; buds tomentose. *Leaves* trifoliate, sometimes 1 or 2; leaflets aborted; common petiole 1.7 in., slightly margined. *Leaflets* 2.5-6.5 by 1.2-2.4 in., lanceolate, elliptic or obovate, blunt acuminate, usually with emarginate tip, obscurely crenate, crenatures glandular, coriaceous, glabrous on both surfaces, lateral nerves prominent beneath, 14-16 on either half, mostly forming loops near the margin, with many intermediate ones, base tapering or narrowed to the short margined petiolule; petiolule up to .1 in. long. *Flowers* small, 4-5 merous, greenish in pubescent axillary and terminal peduncled panicles of cymes shorter than the leaves; bracts and bracteoles minute, acute, danicle branches alternate. *Calyx lobes* minute, triangular, acute.

Petals about .1 in. long, obtuse, valvate. *Ripe carpels* red, solitary, size of a pea, slightly pitted; seeds globose, black, shining.

KHASI HILLS 4-5000 ft.

Wood light yellowish white, hard, close grained.

Flrs. 5. Fr. 10-1.

3. TODDALIA Juss

Toddalia aculeata Pers. Syn. *T. asiatica*, Lamk. Sans. *Dahaka*, *Kanchana*. Vern. *Warlap-rikang*, Mik.; *Mulkiber-doukha*, *Ingeorach*, *Neuraji-doukha*, Kach.; *Ling-seru*, Kuki; *Nachi-wagum*, Garo.; *Soh-sat-khlaw*, Khasi (Nongston); *Shia-sien-ung*, *Sia-soh-sat*, Khasi; *Saryng-khlem*, Synt.

A large scandent evergreen shrub armed with curved or straight prickles, those on large stems on large conical bases; young shoots rusty tomentose. *Leaves* alternate, 3-foliate; common petiole .7-1.7 in. long. *Leaflets* sessile, 1.5-4 by .6-1.5 in., obovate, oblanceolate or lanceolate, usually bluntly long-acuminate, cuneate at the base, crenulate or subentire, more or less coriaceous, glabrous, minutely pellucid-punctate, aromatic, pungent to the taste; lateral nerves many, slender, straight. *Flowers* white or pale yellow, unisexual .2 in. across, usually in pubescent axillary cymes, which are often paniced; panicles sometimes terminal; bracts minute; pedicels very short. *Calyx* 5-lobed, small, glandular, pubescent outside. *Petals* 5, induplicate-valvate, about .1 in. long, oblong or lanceolate, hooded at the apex, gland-dotted. *Disk* fleshy, grooved, glabrous. MALE FLRS.—*Stamens* 5: filaments slender and longer than the petals; anthers round with a gland on the back; ovary rudimentary, cylindric-oblong. FEMALE FLRS.—*Staminodes* 0. *Ovary* 4-celled, more or less 5 grooved; style very short or 0; stigma 5-lobed; ovules 2 in each cell, superposed. *Fruit* a globose berry, .3-.4 in. across, generally 5-grooved or -lobed, pale-orange when ripe, pitted on the rind. *Seed* one in each cell, reniform, rounded on the back; testa coriaceous; embryo curved, terete.

Generally in shady and swampy localities in all the DISTRICTS particularly DARRANG, ascending to 6400 ft. in KHASI HILLS.

The bark of the roots yields a yellow dye and a bitter aromatic tonic which is believed to be more efficacious as an antiperiodic than quinine. It contains small quantities of the alkaloid Berberine. The fruit is often attacked by insects which change them into galls of various shapes and sizes. Wood yellow.

Flrs. 1-10, Fr. 8-1.

4. ACRONYCHIA Forst.

Acronychia laurifolia Bl. Vern. *Ing-long-pharse-arong*, Mik., *Kogema-iaopa-phang*, Kach., *Paking-changne*, Daff.; *Bol-thimatchi*, *Bolgrak*, Garo; *Dieng-soh-phlang*, Khasi; *Sarmon-blai*, *Dieng-soh-neuriong-blei*, Synt.

A small unarmed evergreen tree up to about 40 ft. in height and nearly 3 ft. in girth; young shoots glabrous. *Bark* grey or brown, corky outside, about .5 in. thick; inside greenish brown on young stems, reddish with fine white streaks on mature trees, sweetish to the taste and aromatic. *Leaves* usually opposite, 1-foliolate. *Leaflets* 3-6 by 1-2.2 in., oblong or obovate-lanceolate, obtusely acuminate, entire, thinly coriaceous, aromatic with the smell of green mango, glabrous, shining above, pale green or glaucous beneath, turning yellow before falling; translucent dots minute; lateral nerves about 12 on either half, joining to form a much looped jagged intermarginal nerve well away from the margin; base acute; petiole .3-1 in. long, slightly channelled, somewhat dilated at the base and swollen at the upper extremity where the blade is articulated. *Flowers* white, faintly scented, polygamous, in long peduncled, paniculately corymbose axillary cymes; peduncles up to 3 in. long, panicle branches upto 1 in. long; pedicels .2 in. long, slender; buds oblong. *Calyx* very small, lobes 4, acute. *Petals* 4, valvate, .2 in. long, tapering to a more or less cucullate tip, hairy at the base inside. *Disk* thick, hairy. *Stamens* 8, shorter than the petals and alternately longer; filaments very finely pointed. *Ovary* 4-celled with 2 superposed ovules in each cell. *Fruit* a capsule, .8-5 in. diam., usually 4-lobed and beaked, glabrate.

Throughout ASSAM ascending to about 4000 ft. in KHASI HILLS (near Cherrapunji).

Wood pale-white, fine and even-grained, weighing about 40 lbs. per c. ft.

Firs. 12-4. Fr. 11-2 (of the following year ?).

5. SKIMMIA Thunb.

Skimmia laureola Hk. f.

An aromatic evergreen shrub up to 10 ft. high branched from the base, all parts glabrous. *Bark* greyish-white, smooth; branches with scattered warty lenticels. *Leaves* crowded at the ends of branches alternate, simple, very variable in size and shape, 2-5 by .7-1.6 in., oblanceolate, lanceolate or oblong-lanceolate, acuminate, softly coriaceous, glabrous, dark green above, paler beneath, lateral nerves indistinct, midrib prominent; base narrowed; petiole narrowly margined, .2-.5 in. *Flowers* white or greenish yellow, polygamous, .8-.5 in. across in terminal erect usually compact panicles, .7-2 in. long; bracts .1 in. long, persistent, ovate oblong, acute, ciliolate; bracteoles similar but small, deciduous; pedicels very short. *Calyx* persistent, lobes imbricate, suborbicular-ovate, obtuse, ciliolate. *Petals* 5, subimbricate, about .15 in. long, oblong, much longer than the calyx. *Disk* obsolete. *Stamens* 5, hypogynous about as long as the petals; filaments subulate; anthers dorsifixed. *Ovary* ovoid, 2-5 celled; ovule 1 in each cell, pendulous from the top; style stout; stigma capitate, 2-5 lobed. *in male flowers* ovary usually of 2-3 (sometimes up to 5) rudimentary carpels, free except at

base, free ends subulate. *Fruit* subglobose. 3·4 in. across, containing 3-2, sometimes 1, cartilaginous 1-seeded stones, albumen fleshy; cotyledons flat.

KHASI & JANTIA HILIS—Lumsuiyar (Dumpep) 6390 ft.—not common.
Flrs. 4, sometimes 11—a second flush? Fr. rainy season.

6. GLYCOSMIS Correa.

Glycosmis pentaphylla Corr. incl. *G. arborea*, DC. Vern. *Hengna-poka*, *Hengena-poka*, Ass. (Sib.) *Tultha-poka*, Ass. (Now); *Chagol-ladi*, *Chaul-dhoua*, Ass. (Kam); *Pleg-it-arong*, *Huummucha*, *Theng-lokso-arong*, *Jami-reng-reng-arong*, *Chingchor-arong*, *Thengpitungmeng*, *Wo-chora-a-anarong*, Mik.; *Tasung-changne*, Daff.; *As-sera*, Beng.; *Matkhila*, E. Bengal; *Bon-jamir*, Sylh.; *Dieng-soh-sning*, *Dieng-kasiar*, Khasi; *Dieng-kajat-ske*, Synt. *Serebilijira*, Cach.

An evergreen shrub or small tree up to 15 ft. in height with corky grey or blackish bark. *Leaves* imparipinnate, rachis variable up to 3·5 in. long. *Leaflets* 1, 3 or 5, very rarely 7 usually alternate, very variable in size and shape, 3-12 by 1-5 in., elliptic, ovate, obovate oblanceolate or lanceolate acute or acuminate, entire or crenulate, thinly chartaceous, dark green above, pale beneath, giving an unpleasant smell when bruised; translucent dots not distinct, lateral nerves 8-10, anastomosing at the outer extremities, tertiaries laxly reticulate; base cuneate or acute; petiolule usually up to about 2 in. long, sometimes more. *Flowers* variable in size, generally in axillary but sometimes also in terminal rusty often furfuraceous, pubescent or puberulous erect panicles, very short to 4 in. long; bracts small, ovate acute; pedicels minute. *Calyx-segments* 4-5, imbricate, more or less rounded, ciliolate. *Petals* 4-5, imbricate, 2 in. long, obovate. *Stamens* twice as many as the petals; filaments subulate, free; anthers introrse, with a dorsal or apical gland. *Ovary* sunk in the disk or more or less free, more or less rugose with glands; style short. *Fruit* a berry, white or pinkish when fully ripe.

Of this very variable plant several varieties and subvarieties are recognized by Hooker but all more or less connected by intermediates. The forms commonly found in our area may be classified as follows:—

Var. I.—*Leaves* usually 3, less often 1- or 5-foliolate, large oblong or obovate-lanceolate, entire or obscurely crenulate; panicles elongate, many flowered, often towards the ends of the branches; ovary usually rugose with mamillate glands, 5-celled, connate at the base with the disk.

Var. II.—*Leaves* 3-5 foliolate, rarely 1-foliolate (Sub var. *longifolia*); panicles small, few-many flowered; ovary 4-5 celled, constricted at the base and thus free from the disk, scarcely mamillate.

Sub var. 1. *longifolia* Hk. f. *Leaves* 1-foliolate, large, often acuminate, panicles short.

Sub var. 2. *macrophylla* Hk. f. *Leaves* 3-5 foliolate or 1-foliolate, disk thick, broader than the ovary.

Sub var. 3.—*angustifolia* Hk. f.—*leaflets* usually 3-5, not large, narrow and lanceolate, entire, panicles short, sometimes arboraceous.

Mostly low hills--N. CACHAR, KHASI HILLS up to 2000 ft.

Sub var. 4? Often attaining the dimension of a small tree; leaflets 3-5, sometimes 1, usually acuminate, large to medium sized; style long almost equalling the ovary.

Ascending to 2000 ft. in the KHASI HILLS.

Generally in the neighbourhood of swamps or on banks of sluggish streams or under bamboo and mango-topes, all over the province, ascending to about 2000 ft.

Wood white, compact, suitable for tent-pegs, handles of tools etc. Branchlets are used as tooth-brushes. The ripe berries are edible.

Flrs. & Fr. 1-4, often throughout the year.

7. CLAUSENA Burn.

Unarmed shrubs or small trees. *Leaves* imparipinnate, deciduous; leaflets alternate. *Flowers* small, 4-5 merous, in terminal or axillary panicle cymes or racemes. *Calyx* 4-5 lobed or partite. *Petals* imbricate. *Stamens* 8-10; filaments alternately shorter, abruptly dilated below the subulate tip. *Ovary* stipitate, usually 4-5 celled; style deciduous. *Berry* oblong or globose. *Seeds* with membranous testa; cotyledons plano-convex.

Small shrub. Leaflets never exceeding 11 in number, glabrous. Ovary glabrous.

.. *C. heptaphylla*.

Large shrub. Leaflets never less than 15 in number, pubescent beneath. Ovary hairy.

.. *C. excavata*.

1. *Clausena heptaphylla* W. & A. Vern. *Kebu-taye*, Abor; *Dieng-siang-mat*, Khasi (Nongkla); *Ja-lamari*, Khasi (Shella); *Santhlung-suarhui*, Lush.; *Arhui-thi*, Kuki.

A small bushy shrub, smelling of aniseed; branchlets thin, glabrous, terete. *Leaves* 9-15 in. long; petiole terete, as thin as branchlets, glabrous or minutely pubescent; leaflets 9-5, rarely 11, 2-6 by 1-2 in., elliptic-lanceolate, caudate, usually emarginate, tapering to an acute base, slightly crenulate, membranous or thinly coriaceous, glabrous, pale beneath; translucent dots of unequal sizes, thinly scattered; main lateral nerves slender, 6-8 on either side of the midrib; base more or less oblique; petiolule 1-15 in. long. *Panicles* terminal and axillary, 1-4 in. long, with short slender spreading racemose branches. *Calyx-lobes* 4-5, short, broadly oblong-ovate, acute. *Flowers* 15 in. diam., on slender short pedicels. *Petals* 4-5, white, fading to pale yellow, oblong glabrous. *Ovary* 4-grooved, glabrous. *Berry* 5 in. long, glandular, orange or red when ripe.

Pillung, N. E. FRONTIER, not common. LUSHAI HILLS-Tipaimukh; CACHAR-Sonai reserve, KHASI & JAINTHIA HILLS up to 2000 ft.

The leaves are chewed with *pan* leaves and are also used for flavouring tobacco.

Flrs. 4-5. Fr. cold season.

2. *Clausena excavata* Burn. Vern. *Narasingha*, Ass. (Sib.); *Bengjari*, Ass. (Nowg.); *Theng-sah-soh-arong*, Mikir; *Samdarukhi*, Kach.; *Sam-sweng*, Garo; *Dieng-tyrur*, Khasi.

A large shrub 8-12 ft. high, sometimes a small tree up to 20 ft. in height, unpleasantly aromatic, closely resembling

Murraya Koenigii Spreng, in this respect, also in foliage and habit; young parts and inflorescence grey-tomentose. *Leaves* 8-30 in. long; rachis terete, tomentose; leaflets 15-30, rarely up to 35, shortly petioluled, 1-3 by 3-1 in., obliquely-oblong to ovate-lanceolate, acute, finely crenulate, with large marginal translucent pubescent glands, membranous, pubescent beneath. *Panicles* 4-12 in. long with spreading (alternate cyme-bearing) branches; pedicels slender up to 15 in. long. *Flowers* tetramerous, .15 in. across, dull-white; calyx lobes hairy, broad, acute; petals oblong, glabrous; ovary villous. *Fruit* .75 in. long, oblong or obovate.

Fairly common under sal in NOWGONG and also GARO HILLS, N. CACHAR HILLS, Dimapur-SIBSAGAR, KHASI HILLS-foot hills, Shella.

The leaves and twigs are put to much the same uses as those of *Murraya Koenigii* Spreng-also used medicinally.

Flrs. 3-4.

C. sufruticosa W and A. An undershrub growing in shade in deep jungle. *Leaves* imparipinnate, common petiole terete, tomentose, 10-15 in. long. *Leaflets* 5-17, 1.5-4 in. long, ovate to lanceolate, acute or acuminate, entire, softly tomentose (often silky) especially when young, more densely beneath, very oblique at the base; petiolule short. *Panicles* 2-5 in. long, lax below the leaves and at the base of current year's shoots; pedicels filiform, .2-.4 in. long. *Flowers* .2 in. across, sepals 4, ovate, acuminate, puberulous outside. *Petals* 3-4, slightly imbricate, oblong-obovate, blunt, slightly glandular puberulous. *Stamens* 8, free, hypogynous; filaments dilated below. *Ovary* 4-celled on a hypogynous disk; style cylindrical, thick; stigma terminal. *Fruits* not seen.

KHASI HILLS, *De-Silva*! LUSHAI HILLS, *Gage*! ASSAM, *Simmons*! CHITTAGONG HILL TRACTS; *Prain's collector*! *Lister*! *Gamble*!

Flrs. 3-6.

8. MURRAYA Linn.

Unarmed shrubs or small trees. *Leaves* alternate, imparipinnate. *Leaflets* alternate, petioluled. *Flowers* 2-sexual, in cymes or corymbs, generally terminal, sometimes solitary. *Calyx* 5-fid. *Petals* 5, valvate, slightly imbricate. *Stamens* 10; filaments subulate, alternately shorter; anthers short. *Ovary* usually 2-celled; style simple, long, articulated, deciduous. *Fruit* a berry. *Cotyledons* fleshy, plano-convex.

An evergreen shrub or small tree. *Leaflets* 3-9,

glossy green. *Flowers* 1 in. long. *Ripe fruit* red.

.. 1. *M. exotica*.

A deciduous shrub. *Leaflets* 9-25, dull green.

Flowers scarcely .5 in. long. *Ripe fruit* black.

.. 2. *M. Koenigii*.

1. *Murraya exotica* Linn. Vern. *Kamini*, Beng. and Ass.; *Kolong-asing*, Miri and Abor; *Deijir* or *Dengjir-arong*, Mik., *Misui-athep*, *Sinsri-kanthou*, *Chinjai-mailo-phang*, Kach., *Dem-dem-ali*, Kuki; *Ling-kun*, Lushai.

A very handsome shrub or small tree up to 20 ft. in height; bark corky outside, very thin; fragrant, compact and granular within, branches greenish grey, striate, young parts puberulous. *Leaves* 3-9 foliolate; rachis 1.5-4 in. long, finely channelled, glabrous or slightly puberulous above. *Leaflets* 1-4 by .5-1.8 in.,

obliquely rhomboid or elliptic lanceolate, bluntly acuminate with notched tip or acute entire, thinly coriaceous, dark-green and shining above, totally glabrous when mature; base broadly cuneate; petiolule 1 in. long. *Flowers* 1 in. long, milky-white, sweet-scented, in terminal or axillary few-flowered puberulous corymbs, sometimes solitary when axillary. *Sepals* minute, acute pubescent, dotted. *Petals* oblong-lanceolate. *Ovary* linear, 2-celled. *Berries* 5-7 in. long, 2-seeded, narrowed at both ends, rugose, dotted, red or deep orange when ripe.

Not uncommon in shady ravines, throughout ASSAM extending to low hills. Often cultivated as an ornamental plant.

Wood light-yellow, close grained and hard, capable of being used as a substitute for box wood for engraving purposes; weight 62 lbs. per c. ft. The branches make very good handles for implements, also walking sticks, while the twigs are much used for cleaning teeth. The Mikirs distill a thick gum by burning green wood, which their women use to blacken their teeth.

Flrs. 3-5. Fr. 12-1.

2. *Murraya Koenigii* Spreng. Vern. *Narasingha*, *Bishahari*, Ass.; *Nor-hing*, Ass. (Kam.); *Thengsakso*, Mik., *Sam-khatsi*, Garo.

A deciduous shrub with a strong smell; bark thin, dark-brown or almost black outside, blaze greenish-white; young parts downy. *Leaves* 6-12 in. long; rachis terete, pubescent; leaflets 11-35, 1-2 in. long, ovate or lanceolate, oblique at the base, obtusely acuminate or retuse, subentire or irregularly crenulate; glabrescent except along the midrib on either surface; petiolule 1 in. long, puberulous. *Flowers* white, 3-5 in. long, white, in terminal corymbose panicles. *Sepals* small, acute. *Petals* oblong, dotted. *Ovary* 2-celled. *Fruit* 3 in. across, subglobose, rugose, black when ripe. *Seeds* 2, imbedded in mucilage.

Recorded from all Districts except LAKHIMPUR, ascending to 3000 ft. in KHASI HILLS. It has often a gregarious tendency.

It very closely resembles *Clausena excavata* so as to share the same vernacular names and to be applied to the same uses with it. The leaves are much used for flavouring curries in the Madras Presidency and probably also by the Mikirs.

Flrs. 2-3. Fr. 4-5.

9. MICROMELUM BL.

Micromelum pubescens Bl. Vern. *Sagladi*, *Bon-jamir*, Ass. (Sib); *Hilaguti-gach*, Ass. (Darr.); *Gobor-huti*, *Bhaura*, *Bhaluk-dat*, *Padragota*, *Gobor-hura*, Ass. (Kam.); *Koroiphula*, Syl.; *Theng-hanse*, Mik., *Galing-asing*, Abor., *Silkhul*, *Marsusepel*, Garo., *San-mani*, Mech., *Dieng-tyrpei*, Synt.; *Dieng-soh-ilai-shree*, Synt., (Raliang); *Dieng-syrngam*, Khasi (Shella); *Dieng-soh-rang-soi*, *Dieng-soh-sat*, Khasi, (Nongkla), *Dieng ja-iao*, Kh.

A handsome small evergreen tree, 15-30 ft. in height; young parts pubescent; bark yellowish-grey, somewhat rough outside, thin; yellowish inside. *Leaves* 9-20 in. long, rachis terete, pubescent; leaflets 7-15, generally alternate, occasionally sub-

opposite, 2-6 by 1.25-2.5 in., obliquely ovate-lanceolate, wavy or obscurely crenulate at the margins, thinly coriaceous, glabrous above, tomentose or pubescent beneath along the nerves, closely gland dotted; main lateral nerves 8-10 on either side of the midrib; base cuneate, petiolule 1.15 in. long. *Flowers* dull white, strongly scented, 3.5 in. across, in spreading terminal corymbose-ly decomposed panicles of tomentose cymes; pedicels 1.3 in. long, minutely bracteate, up to 6.5 in. long; buds oblong; calyx truncate or with triangular lobes; petals 5, valvate, narrow-oblong, pubescent; stamens 10, alternately long and short; ovary usually 5-celled, villous along lines running lengthwise, shortly stipitate; style deciduous, articulate with the ovary; stigma capitate; ovules 2, superposed in each cell. *Fruit* a dry berry, 2.3 in. long, oblong, orange-yellow when ripe, usually 1-seeded. *Cotyledons* green, leaf-like, crumpled.

Fairly common throughout ASSAM, ascending to 4000 ft. in KHASI HILLS.

Flrs. 12-2. Fr. 3-4.

10. LUVUNGA Hamilt.

Luvunga scandens Ham. Vern. *Long-phul*, Ass., *Lavanga-lata*, Beng., Sans. *Luvungalata*.

A powerful scandent evergreen shrub, generally tufted from the ground with strong axillary sharp straight or slightly recurved spines. *Bark* ash-coloured, somewhat rough, about 1 in. thick; cream-coloured inside. *Leaves* alternate, simple on young shoots, afterwards digitately 3-foliolate; petiole 6.3 in. long, finely channelled above, glabrous. *Leaflets* 4-9 by 1.2-2 in., oblong-lanceolate, narrowed at both ends, quite entire, firmly coriaceous, dark-green, quite glabrous, minutely punctate both above and beneath; lateral nerves about 15 on either side, arched, very slender, scarcely visible in green leaves; petiolules 2.3 in. long, margined. *Flowers* white, fragrant, about 1 in. diam., in axillary branched racemes with cymose branches, sometimes from old wood, shorter than the petioles; pedicels about .3 in. *Calyx* cup-shaped, about .15 in. long, minutely 4-6 toothed. *Petals* 4-5, 4-5 in. long, linear-oblong, fleshy, recurved. *Filaments* 8-10, glabrous, united below; anthers linear. *Disk* fleshy, annular. *Ovary* 3-celled with 2 superposed axile ovules in each cell. *Fruit* an oblong berry, about .8 in. long, obscurely 3-lobed, 1-3 seeded, with an aromatic pulp. *Seeds* ovoid, pointed; radicle superior; cotyledons green, fleshy; albumen 0.

Only found in the Nambor Reserve by Mr. Mann (who has described it as a tree 4 ft. in girth) and on the Sadasew hillock and Nigheriting, DISTRICT SIBSAGAR, by my collector Babu Ramesh-Chandra Purkayastha.

A very ornamental plant worthy of a place in gardens.

Flrs. 2-4. Fr. 8-9.

11. ATALANTIA Correa.

Atalantia monophylla Correa. Vern. *Ching-kamla*, *Bankamla*, Manip., *Ramser*, Lushai.

A small tree or large shrub; stems greenish-brown outside, pale greenish-yellow inside, branches rigid, older armed with sharp axillary spines; branchlets puberulous. *Leaves* 1-foliate; leaflets 2.5-4.5 by .7-1.7 in., lanceolate or elliptic-ovate-lanceolate, bluntly acuminate, emarginate at the tip, entire, coriaceous, glabrous; lateral nerves 10-12 on either half with many intermediates between, looping near the margin, ends forming a very wavy more or less continuous nerve; base cuneate; petiole .1-.3 in., channelled with two subulate stipular scales at the base. *Flowers* white, in puberulous fascicles or contracted corymbose cymes in leaf axil; pedicels .15-.4 in. long; bracts minute. *Calyx* irregularly split at the base at the time of flowering or after it to the base, lobes very short, ciliolate. *Petals* .4 in. long, obovate-oblong, adnate to the staminal tube. *Stamens* 8; filaments united almost through their entire length into an irregularly cleft tube; anthers small, elliptic; disk inconspicuous, short. *Ovary* tapering to the style; 3-5 celled; style long, cylindrical; ovules 1 or 2, collateral. *Berry* globose like a lime, rugose and glandular outside, .6 by .5 in., 4-celled; cells 1-seeded.

N. CACHAR HILLS, Borail Res.; CACHAR, Rukni Inner line reserve; Barak Inner line reserve; Mynadher; KHASI HILLS at the foot bordering SYLHET-Thienpyngam.

Wood yellowish, hard.

Fr. 5.

The apex of the leaves is described as "obtuse" by several authorities but this does not apply to any of the Assam specimens examined by me.

Atalantia caudata Hk. f. Unarmed shrub. *Leaflets* 3-7 in., very variable, linear lanceolate to elliptic, obtuse, or obtusely acuminate, emarginate at the tip, glabrous, subcoriaceous, entire; base with a pair of slender sub-basal nerves; Petiole channelled, .7-.8 in. long. *Flowers* 2-3 in. across, white, fragrant, in very short glabrous racemes with slender pedicels. *Calyx* very small, sub-regularly 4-5 lobed; petals obovate-oblong; stamens free; disk narrower than the ovary. *Ovary* 2-celled ovules 2-collateral. *Fruit* globose, .5-.8 in. across.

ASSAM—Masters (!); CACHAR (Jirighat), Prazer (!); KHASI HILLS—Cherra-Hooker.

Flrs. 3-5. Fr. 11-12.

Atalantia ? sp.—A small tree about 25 ft. in height and 2 ft. in girth, bark greyish-white, warty and also with lines of fine lenticels, thick, blaze reddish with green edges; young parts puberulous. *Leaflets* 5-6.5 by 1.3-2 in., obovate or obovate-oblong, acuminate, subcoriaceous glabrous, lateral nerves 20-24, ends looping near the margin, gland dots close; base gradually narrowed; petiole indistinctly jointed, channelled, puberulous or glabrate. Flrs. and fr. not seen.

Incomplete specimens from Dirju, LAKHIMPUR (Sheet 4388). Further material needed for correct determination.

12. PARAMIGNYA Wight.

Scandent or erect shrubs, armed with axillary spines or unarmed. *Leaves* 1-foliate, entire, subcoriaceous. *Flowers* rather

large, axillary, solitary or fascicled. *Calyx* teeth 4-5, small. *Petals* 4-5, free, imbricate, rarely valvate. *Disk* thin, columnar. *Stamens* 8-10, free, filaments inserted round the disk, usually hairy, anthers linear-oblong. *Ovary* 3-5 celled; style elongate, deciduous; stigma capitate; ovules in each cell 1 or 2, obliquely superposed. *Fruit* an ovoid or subglobose berry, 1-5 seeded, rind thick; seeds large, oblong, compressed; testa membranous, cotyledons fleshy, equal.

I. Calyx not cupular; teeth acute:—

Flowers less than .7 in. across:—

Leaves pubescent along the midrib above,

tomentose beneath. Flowers over .5 in.

across. Berry rounded, not pointed at apex.

Leaves glabrous, except along the midrib

beneath. Flower .3 in. across. Berry obtusely

5-angled, pointed.

.. 1. *P. Griffithii*.

.. 2. *P. citrifolia*.

II. Calyx cupular; teeth obscure, rounded if present.

Berry small.

.. 3. *P. monophylla*.

1. **Paramignya Griffithii** Hook. f. Vern. *Bonjora*, Ass.; *Ingsuthesolo-rikang*, Mik.; *Thaisa-gulangi*, *Thai-saiya-suggur-biding-doukha*, Kach.; *Soh-nari-khlaw*, Khasi.

An evergreen scandent shrub with strong axillary recurved spines; young parts tomentose. *Bark* grey-corky and vertically fissured on old stems, yellow inside. *Leaflets* 2.5-5 by 1-2 in., oblong or elliptic, bluntly acuminate, entire or nearly so, rounded or sub-cordate at the base, thinly coriaceous, glabrous above except along the midrib, softly tomentose beneath at least when young, afterwards sometimes glabrescent; translucent dots numerous; main lateral nerves 10-12 on either side of the midrib; petiolule indistinctly jointed with the petiole, both together 2-3 in. long, generally twisted, pubescent. *Flowers* white, .5-.6 in. long, solitary or a few together in short axillary cymes; pedicels hairy, jointed near the base up to .15 in. long. *Calyx* hairy outside, with 5 deltoid teeth. *Petals* 5, .4-5 in. long, lanceolate, imbricate, glabrous. *Stamens* generally 10, nearly as long as the petals; filaments tapering, shaggy except near the thin upper extremity; anthers scarcely .1 in. long, oblong. *Ovary* 5-celled, hairy; style .4 in. long, hairy only at the base. *Fruit* .8-1.2 in. diam., globose or slightly ovoid, terete, glabrous, rugose and usually dark-green; pulp aromatic, very acid.

Gaurisagar, Kujibali, Mahmora, Akhoiphutia, Rengma Res., etc. in SIBSAGAR, generally in shady marshy localities; ravines in the MIKIR HILLS; KAMRUP, Garuchara forest; GOALPARA; N. C. HILLS, KHASI & JAINTIA HILLS up to about 3000 ft., Barpani.

Flrs. 3-4. Fr. 9-1.

2. **Paramignya citrifolia** Hk. f. Vern. *Mei-soh-khar-khlaw*, Kh.

An armed shrub with grey stem; spines recurved .3-1 in. long, base greenish tip polished; twigs greenish grey; young shoots puberulous. *Leaflet* 3-6 by 1.3-2.6 in., faintly unpleasantly scented, elliptic-ovate or oblong, bluntly acuminate, entire, slightly

glabrous on both surfaces except along the midrib beneath, coriaceous with numerous translucent glands which appear as raised dots on the undersurface; lateral nerves rather obscure, 10-12 on either half, forming loops near the margin, with many intermediates of nearly equal thickness; base rounded or obtusely narrowed; petiolules somewhat obscurely articulated to the petiole, both twisted pubescent and together up to 4 in. long. *Flowers* axillary, about 3 in. across, white; peduncle about 25 in., jointed near the base, pubescent; bracts minute, inserted at or below the joint. *Calyx* pubescent with 5, triangular acute teeth. *Petals* 5, oblong, smooth. *Filaments* 10. *Fruit* about 1 by 8 in., ovoid and of the colour of a lemon and with a similar rind, obtusely 5-angled, pointed about 1 by 8 in.; seeds 3-5, large.

KHASI HILLS on the foot hills above SYLHET ascending to about 200 ft. —Nongkha, Thleusyrungam, Sutynga, Raliang, Flrs. hot season. Fr. 12.

The description of the floral organs have been taken from Roxburgh's *Flora Indica*.

3. *Paramignya monophylla* Weight.

A scandent shrub; younger branches terete, pubescent or glabrous, green. *Leaflet* 2.5-5 in., ovate-lanceolate, elliptic or somewhat obovate, bluntly acuminate, both surfaces nearly alike, undersurface dotted; petiolule obscurely jointed to petiole, both twisted and 5-75 in. long. *Flowers* axillary 1 in. across, white, drooping; pedicels curved 2 in. long, puberulous, jointed, with 2 or 3 subulate bracts inserted at or below the joint. *Calyx* cup-shaped, obscurely toothed. *Petals* 5, linear-spathulate, 5-6 in. by 2 in., broad at base, spreading, erect, imbricate with green pellucid dots. *Stamens* 10, free; filaments thick, hairy inside, 4 in. long, curved backwards at the apex. *Ovary* 3-celled. *Berry* ovoid, size of a nutmeg, "very much like a lime"—Roxburgh. *Seed* 1 in each cell.

KHASI HILLS—Hooker. There are no specimens at Calcutta from our area.

Flrs. 4. Fr. 8 (Darjeeling).

13. CITRUS Linn.

Trees or shrubs usually with sharp axillary spines. *Leaves* alternate, 1-foliolate, coriaceous, pellucid, punctate, aromatic; petiole often winged. *Flowers* fairly large, axillary, white or pinkish, sweet scented, solitary or in small cymes or racemes, sometimes 1-sexual. *Calyx* cup-shaped, 3-5 toothed. *Petals* 4-5, rarely more, fleshy, gland-dotted, imbricate in bud. *Disk* fleshy, annular or cup-shaped. *Stamens* 20-60; filaments flattened at the base, usually united into several bundles. *Ovary* many-celled; style stout, deciduous; ovules in 2 series in each cell. *Berry*, globose or oblong, fleshy, rind leathery, many celled with membranous septa, filled with transverse fusiform vesicles containing acid or sweet juice. *Seeds* few in each cell; testa

leathery ; embryo sometimes two or more in each seed ; albumen 0 ; radicle superior.

- I. Petiole not or narrowly winged ; leaves glabrous : -
 Flowers tinged with red, often 1-sexual. .. 1. *C. medica*.
 Flowers pure-white, always 2-sexual. .. 2. *C. Aurantium*.
- II. Petiole broadly winged. Flowers generally white : -
 Leaves glabrous. Vesicles colourless coherent. .. 3. *C. Hystrix*.
 Leaves pubescent beneath. Vesicles pinkish or pale yellowish. Fruit 4-8 in. in diam. .. 4. *C. decumana*.

The above classification has been drawn up for separating the well marked forms that are commonly found in our area. Dr. Bonavia who devoted several years to the study of limes, citrus and oranges of India has shown (*Cultivated oranges and lemons of India and Ceylon*) that such definite lines cannot be drawn between the races now cultivated. The pumelo approaches in many respects *C. Hystrix*, while the limes come near to the some of the forms of the true orange. Dr. Bonavia also maintains that all true limes have been derived from *C. Hystrix* (Journ. Linn. Soc. XXII-23). He also hazards the opinion that *C. decumana* may have developed from the Malta or Portugal orange or derived from a common ancestor both having red vesicles. It seems probable therefore that *C. Hystrix* is the ancestral forms of all limes and oranges of which the wild forms now found in several parts of India are local manifestations.

1. *Citrus medica* Linn. Vern. *Bakol-khowa-tenga*, *Jora-tenga*, Ass. ; *Tume-han-thor*, Mik. ; *Naya-changney*, Duff. ; *Harijange*, Manip. ; *Misser*, Tipp. ; *Shashni-jamir*, Sylhet ; *Soh-manong*, Khasi ; *Dieng-soh-sarman*, Synt.

A bushy shrub ; young shoots glabrous, somewhat angled ; spines ascending, straight, 2-1 in. long. *Bark* greenish, on old stems with close shallow vertical fissures, greenish white. *Leaflets* light green, 3-6 by 2-2.5 in., elliptic-ovate or oblong, oblong-lanceolate or obovate rounded or with an obtuse apex, narrowed or cuneate at the base, crenulate-serrate, with translucent dots at the sinuses, chartaceous, aromatic, covered with translucent dots ; main lateral nerves 10-12 on either side of the midrib, slender, irregular ; petiole 2.5-4 in. long, naked or very narrowly winged. *Flowers* waxy-white, usually tinged with red, sweet-scented, solitary or up to 10 in a raceme, nearly 1 in. long ; pedicels up to 2 in. long, often 1-sexual ; buds oblanecolate. *Calyx* obconic, truncate or very shallowly toothed. *Petals* linear-oblanecolate, gland-dotted. *Stamens* 20-40 ; filaments reddish, pubescent. *Fruit* 3-5 by 2-3 in., obovoid-oblong, often mamillate at the apex, yellow when ripe, very aromatic, with the thick spongy rind and coherent colourless small vesicles filled with acid aromatic juice.

Common along edges of marshes and sluggish streams throughout ASSAM, ascending about 4200 ft. in KHASI HILLS,

The acid juice of the fruit as also its sweetish inner rind is eaten. Of the other cultivated varieties some forms of Var. *acida*, the acid lime of India are commonly cultivated, the other varieties being practically unknown. The wood is white and fine-grained suitable for agricultural implements when of sufficient size. The branches make good walking-sticks.

Flrs. throughout the year but chiefly 3-5. Fr. 10-2.

2. *Citrus Aurantium* Linn. Vern. *Humutia-tenga*, Ass., *Rebo-singking*, Abor; *Generu-ay*, Miri. The orange.

A small tree with darker and denser foliage than the preceding species, smaller and narrower leaflets and smaller and weaker spines; petiolar wing generally very narrow or 0. *Flowers* white, much smaller than of *C. medica*. *Fruit* depressed-globose, oblate, never mamillate, bright-orange; pulp whitish, unpleasantly acid.

Near Pillung in the E. FRONTIER DISTRICT.

This plant is probably the true wild orange. It should be further studied in the field.

Flrs. 12.

Excellent oranges are grown in the neighbourhood of Shella in KHASI HILLS, KAMRUP, Margherita and Jeypur in LAKHIMPUR and near Mariani in SIBSAGAR. In the cultivated fruit when ripe the vesicles of the pulp is of a dun orange colour, never white.

The race known as Santara orange, and only to a limited extent in the KHASI HILLS, the Mandarine oranges are cultivated.

3. *Citrus Hystrix* DC. Vern. *Hampur-arong*, Milk., *Chamar-baphang*, Cach., *Satkora*, Sylhet; *Soh-Kyniet*, *Soh-kymphor*, Khasi; *Diengsoh-bah*, Synt.

A tree up to 50 ft., or more in height and 3 ft. in girth; stem sometimes fluted at the base; branchlets compressed and angled; spines ascending, small. *Bark* grey or black, very thin, hard, granular, pale-brown inside with white vertical lines. *Leaflets* 1.3-3.5 by .7-2 in., ovate elliptic or lanceolate on petioles which are winged so as to be equal to or even larger than the leaflets in size and generally obcordately obovate or oblanceolate in shape, retuse at the apex, entire or minutely crenulate, coriaceous, dark-green, glabrous, punctate with oily gland-dots; lateral nerves close and irregular; portion of petiole below the wings .2-.3 in. long, channelled or margined. *Flowers* white or light purplish, .6-8 in. diam., axillary, solitary or in few-flowered short cymes; pedicels up to about 2 in. long, buds obovoid. *Calyx* small with 4-5 deltoid teeth. *Petals* 4, obovate or oblanceolate, .3-.4 in. long. *Stamens* 20-25; filaments free, stout, glabrous. *Ovary* globose, glabrous; style .2 in. long, stout; stigma large, globose. *Fruit* 1.5-2 in. diam., 15-20 celled; rugose outside with large oil glands; vesicles of pulp small, coherent, colourless; juice very acid.

Fairly common in the MIKIR HILLS chiefly on their eastern and southern slopes down to the foot; Garampani, Dhansiri, etc., also in KHASI HILLS where it is sometimes gregarious (e.g. Marrung); NOWGONG (Lamsakhang), N. C. HILLS.

In cultivation the fruits are usually large and resemble a small pumelo. Sometimes cultivated in gardens.

Wood of cream-colour, hard, very tough, fine and even grained weighing 71 lbs. per c. ft. Medullary rays numerous, very fine, straight; pores of moderate size, scanty, irregularly scattered, solitary or in radial groups; annual rings indistinct but there are numerous fine concentric lines which do not represent annual growth. Well worth a trial as a substitute for box wood.

Flrs. 3-4. Fr. 9-11.

Probably the same as *C. ichangueusis* Swingle, which is also said to occur in the Khasi Hills. The older name has been therefore retained for the present.

4. *Citrus decumana* Linn. Vern. *Rebab-tenga* Ass., *Batawi-nebu*, Beng., The Pumelo or Shaddock.

This wellknown fruit tree is cultivated in homestead compounds in the villages and towns of UPPER ASSAM. Young parts pubescent. *Bark* thin, greyish or greenish brown. *Leaflets* 2-6 by 1-2.5 in., oblong or ovate-oblong, crenate, shining above, pubescent at least along the midrib beneath; petiole broadly winged, obovate or oblanceolate in shape. *Flowers* white, sweet-scented; stamens 15-25; style short; stigma capitate. *Fruit* 6-8 in. diam., globose or broadly pyriform, yellow when ripe; vesicles of pulp large, loose, filled with sweet or acid juice; rind thick, spongy, white inside.

The wood is similar to that of the preceding species, but much lighter.

14. ÆGLE Corr.

Ægle Marmelos Correa. Vern. *Bilwa*, Sans., *Bel*, Ass. & Beng.; *Sherbili-phang*, Cach; *Belethi*, Garo., *Soh-Bel*, Khasi. The Bael tree.

This well-known spinous aromatic tree is not indigenous in UPPER ASSAM except along its western boundary, but is cultivated almost everywhere near Hindu Temples. Its characters are so well known that no detailed description is necessary. The spines are straight and axillary up to about an inch in length. The leaves are normally 3-foliolate, but occasionally some are found digitately 5-foliolate. *Flowers* greenish-white, sweet-scented about 1 in. diam., in few-flowered short lateral panicles. *Petals* 4-5, imbricate, fleshy, gland-dotted. *Stamens* up to 50 or more. *Fruit* 2-7 in. diam., 10-15 celled, with a strong clear mucus imbedded in a mass of sweet aromatic mealy pulp.

Wood even and close grained, tough and strong, but liable to split in seasoning; weight 50-60 lbs. per c. ft. The pulp of the ripe fruit is a laxative and mixed with a little milk and sugar makes a very cooling *sherbet*. The unripe fruit either boiled or roasted is used as a specific for diarrhoea and dysentery. The pulp is also used in Bengal and Upper India to strengthen mortar. The mucus of the cells is used for adhesive purposes and is often mixed with water-paints to add to their strength and brilliancy. *Snuff-boxes* are made of the shell of fruits of small size. The leaves are very bitter and are used as a febrifuge; they are also lopped for cattle-fodder. They are considered indispensable for Hindu worship, especially of the God *Siva* and the wood is one of the few prescribed by the Hindu scriptures for sacred fires.

About 150 seeds weigh 1 oz.

Flrs. 3-5. Fruit ripens 3-6, next year.

31. SIMARUBACEÆ.

Trees or shrubs with bitter bark. *Leaves* alternate, unequally pinnate (in the genera found in Assam), usually exstipulate. *Flowers* in axillary paniced cymes, small, regular, generally unisexual. *Calyx* 3-5 lobed, valvate or imbricate. *Petals* 3-5, rarely 0. *Disk* entire or lobed, rarely 0. *Stamens* as many or twice as many as the petals, hypogynous, inserted at the base of the disk; filaments free, often with a scale at the base. *Ovary* 1-6 celled, usually deeply lobed or with distinct carpels; ovules solitary in each cell. *Fruit* drupaceous or samaroid, rarely baccate or capsular, usually carpels more or less distinct. *Seeds* usually albuminous.

Fruit winged. Stamens in flowers twice as many as petals. Large trees. ..

Fruit not winged. Stamens in flowers as many as petals. Small or middle-sized trees :—

Drupe supported by persistent calyx and petals.

Calyx and petals deciduous ...

.. 1. *Ailanthus*.

.. 2. *Picrasma*.

.. 3. *Brucea*.

1. AILANTHUS Desf.

Ailanthus grandis Prain. Indian Forester Vol. XXVIII-P. 131-34, Vern. Borphat, Ass. (N. E. Fr.); *Saragphula*, Ass. (N. Lakh.), *Borkeseru*, Ass. (Lakh.); *Koronga*, Ass. (Darr); *Ring*, Ass.; *Silenq-asing*, Miri & Abor; *Diang-ehao*, Khasi; *Lalang-baiong*, Jaintia.

A lofty tree up to 150 ft. in girth with a cylindrical bole. *Bark* grey outside, nearly smooth excepting for deep horizontal wrinkles, 1-1.5 in. thick; inside yellowish-brown, mottled with white specks and traversed by coarse strands of amber-brown. *Leaves* alternate, 2-3.5 ft. long; leaflets alternate, 6-8 by 2.5-4 in., oblique ovate lanceolate, shortly acuminate, entire or sinuate, chartaceous, glabrous; lateral nerves 10-12 on either half, 1 or 2 pairs with glands; base obliquely cuneate; petiolules .3-.6 in. long. *Panicles* axillary, about a foot long. *Flowers* not seen; pedicels in fruit about 1.2 in. long. *Fruit* of 1-3 samaras with wings both above and below the seed, 4-5 by 1.2-1.5 in. including the glabrous finely nerved wings which are perfectly flat, apex rounded, obtuse, the inner margin of the lower end of the wing thickened by the funicular cord of the seed which is near the middle of the samaras, outer edge of base subtruncate; seed flat, .6 in. across; testa membranous, light-brown; cotyledons oily.

Khairan, Bomjur, N. E. FRONTIER; Rangagora, Digboi, Jaipur LAKHIMPUR; Barpathar, Merapani—SIBSAGAR, Lambabak, Barak, CACHAR; LUSHAI HILLS, GARO HILLS, N. CACHAR HILLS, KHASI & JAINTIA HILLS—Nongkha.

Wood light, white, soft, but can be used for tea-boxes and other packing cases.

Flrs. 9-9 ? Fr. 12-1.

2. PICRASMA Bl.

Trees; every part very bitter. *Leaves* large, imparipinnate. *Flowers* small, unisexual or polygamous, in axillary corymbose panicles. *Calyx* very small, 4-5 toothed. *Petals* 4-5, valvate, very often enlarging after flowering. *Disk* thin, entire. *Stamens* 4-5; filaments hairy, not scaly. *Carpels* 3-5; styles free at the base and apex but united in the middle; ovules erect, solitary. *Fruit* of 1-5 fleshy or coriaceous drupes supported by the persistent calyx and petals. *Seeds* erect, albuminous.

Leaflets 9-15, serrate. ..

Leaflets 3-7, entire ..

.. 1. *P. quassioides*.

.. 2. *P. javanica*.

1. *Picrasma quassioides* Bennet. Vern. *Dieng-khlang*, Khasi.

A small tree; young parts brown, tomentose; twigs dotted with circular lenticels; bark perhaps more bitter than that of *P. javanica*—dark grey to black, fairly smooth or slightly rough outside, dull-white inside. *Leaves* lyrate imparipinnate; rachis 3·5-6·5 in. long, puberulous; leaflets 9-15, lowest pair smallest, penultimate pair largest, opposite or subopposite, 1·5-4 by 5-1·6 in., ovate to lanceolate, long acuminate, serrate, membranous, glabrate with age; lateral nerves 7-9 on either half, prominent beneath, nervules finely reticulate; base often oblique; petiolules of lateral leaflets very short up to .08 in., of the terminal leaflet .5-1 in. long. *Flowers* green, .2-3 in. across in axillary corymbose puberulous panicles up to 6 in. long 5(4) merous; pedicels .2-4 in. long, jointed below the middle. *Calyx* lobes small, imbricate. *Petals* ovate or oblong-ovovate; filaments with thick hairy bases. *Drupels* .25-.3 in. long, 1-5 together, obovoid or globose, black when ripe, supported by the much enlarged coriaceous petals and calyx.

KHASI HILLS above 3000 ft.

Flrs. 4-6. Fr. 7-9.

2. *Picrasma javanica* Bl. Vern. *Putisal* or *Putichhal-asing*, Miri; *Singka-asing*, Miri and Abor; *Nimtila*, Ass. (Lakh.); *Bon-poshla*, Ass. (Sib.); *Putichhal*, Ass. (N. E. F.); *Aeo*, Naga; *Sheng-lokso*, Mik.; *Bor-jagreng*, Garo; *Teju*, Nep.

A middle-sized tree; bark thin, dark-brown or black and more or less smooth outside, dun-brown and reticulated underneath the cuticle, white inside, very bitter; young parts pubescent. *Rachis* 3·5-8 in. long, glabrous. *Leaflets* 3-7 but generally 7·25 by 1-2 in., oblong ovate, elliptic or obovate-oblong, abruptly and somewhat bluntly tailed; quite entire, thinly coriaceous, dark-green, glabrous; main lateral nerves 5-7 on either half, much arched; base cuneate, sometimes oblique; petiolule .1-1·5 in. long, channelled. *Panicles* peduncled, corymbose, axillary, 2-4·5 in. long; branches slightly pubescent. *Flowers* polygamous, dull-white, about .3 in. across; pedicels at first villous, elongating in fruit and then .3-5 in. long. *Calyx* small, 4-toothed,

obes ciliolate. *Petals* 4, about .15 in. long, valvate with slightly conduplicate margins, ovate. *Stamens* 4; filaments short, subulate, hairy. *Carpels* generally 4, alternating with stamens or stamino-odes with barren anthers. *Drupels* 1-4, subglobose, .3-.5 in. long, black when ripe, shining, seated on the cushion-like disk and supported by the accrescent coriaceous petals and calyx which then attain up to .5 in. in length.

Fairly common in shady parts of evergreen forests, throughout the province, ascending to 2000 ft. in KHASI HILLS.

The bark is very bitter and is used as a febrifuge by Mitis and Abors, also by the Nepalese.

Wood light, white and soft, weighing 27 lbs. per c. ft.

Flrs. 4-5. Fr. 10-11.

***P. Nepalensis* Benn.** Vern. *Thigisin*, Garo-has been united with the above by Sir George King (Journal Asiatic Soc. Vol.) a view with which I entirely agree, as I cannot find any constant character by means of which the two could be separated. It is a small tree, which in all characters closely resembles forms of *P. javanica* with narrow leaflets and slender panicles. The fruit is reported to be edible when ripe by local officers, a statement about which I have serious doubts.

GARO HILLS—planted near villages.

Fls. 3. Fr. 4?

3. BRUCEA Mill.

***Brucea mollis* Wall Cat. Vern. *Dieng-la-kasein khlow*, Synt.**

A small shrub; branches speckled with close set lenticels; stems reddish-brown, elegantly marked with reticulate lines; young parts tomentose. *Leaves* alternate, imparipinnate; rachis pubescent, 7-14.5 in. long; leaflets 7-13, lateral opposite, lowest pair smallest, larger upwards, 2-5 by .7-1.7 in., ovate or oblong-lanceolate, acuminate, entire, membranous, pubescent on both surfaces, more densely beneath; lateral nerves 8-11 on either half, arcuate; base often unequal, rounded or cuneate. *Flowers* green, minute, polygamous, in small cymes arranged in axillary pubescent racemes 4-9 in. long; pedicels short. *Calyx* minute, 4-partite; lobes imbricate. *Petals* 4, minute, imbricate, linear, longer than the stamens. *Disk* 4-lobed: stamens 4, inserted beneath the disk; filaments naked. *Ovary* deeply 4-lobed, glabrescent; styles deflexed. *Fruit* of 1-2, less often 3 or 4 drupels, .4-5 by .3 in., orange red when ripe, somewhat fleshy, ovoid, pointed at the apex; stone reticulated; seed exalbuminous; cotyledons fleshy.

KHASI AND JAINTIA HILLS above 3000 ft., KAMRUP-bet. Agrang and Doimari.

Fr. 1.

***B. sumatrana* Roxb.**—A large evergreen shrub, often epiphytic; branchlets stout, tomentose, as are also leaves and inflorescence. *Leaves* 12-15 in. long, imparipinnate; rachis terete; leaflets 9 or 13, 2.5-4 by 1-1.4 in., ovate-lanceolate, coarsely serrate, green above, pale or tawny beneath; base acute; petioles slender. *Flowers* purplish, small in distant cymes arranged on axillary racemes up to 14 in. long. *Calyx* very small. *Petals* larger than calyx segments. *Drupes* .25 in. long, ovoid, somewhat compressed and ridged, black when ripe, stone reticulate.

ASSAM—Hooker, Brandis. I have however seen no specimens at Calcutta from our area.

Flrs. 5-7. Fr. 4-8.

FAM. 32. OCHNACEÆ.

Glabrous shrubs or trees with watery juice. *Leaves* alternate, usually simple, coriaceous; stipules 2. *Inflorescence* paniced or umbellate; flrs. rarely solitary, bracteate. *Flowers* hermaphrodite, conspicuous, usually yellow or orange; sepals 4-5, free, imbricate, persistent, sometimes coloured in fruit. *Petals* 5, rarely 4 or 10, free, hypogynous, imbricate, longer than the sepals, deciduous. *Disk* enlarged after flowering. *Stamens* various, sometimes indefinite, inserted on the disk; filaments persistent; anthers basifixed, sometimes deciduous, dehiscing longitudinally or opening by terminal pores. *Ovary* short, 2-10 celled, sometimes deeply lobed; placenta axile or parietal; style simple, subulate or free at the extremity; ovules 1-2 in each cell or indefinite, ascending or rarely pendulous; raphe ventral. *Fruit* of several drupels or pyrenes each with 1-4 seeds, or capsular; albumen fleshy or 0.

OCHNA Linn.

Deciduous trees, shrubs or undershrubs. *Leaves* serrate. *Flowers* large yellow in bracteate panicles or umbels. *Sepals* 5, coloured, persistent in fruit; petals 5-12; disk lobed, thick. *Stamens* indefinite, shorter than the petals; anthers generally opening by terminal pores, deciduous. *Ovary* deeply 3-10 lobed, each lobe 1-celled. *Drupels* 3-10, each one seeded, seated on the enlarged disk.

Large shrubs or small trees, shoots perennial; branchlets annulate with scars of bud scales; inflorescence corymbose:—

Anthers equalling or a little longer than the filaments in the fully opened flower. Petals usually much exceeding the sepals.

... 1. *O. Wallichii*.

Anthers several times longer than the minute filaments in the fully opened flower. Petals as long as the sepals or a little longer.

... 2. *O. squarrosa*.

Undershrubs; shoots annual; branchlets not annulate; inflorescence umbellate.

... 3. *O. pumila*.

1. *Ochna Wallichii* Planch? Vern. *Khimdabeng*, Garo.

A small deciduous tree; bark dark-brown outside; blaze dark red striated with fine brown veins, pale-green on the edges; bud scale dry, oblong, parallel-veined, concave, unequal up to about .5 in., scars annulate, prominent. *Leaves* 4-9.5 by 1.3-2.3 in., lanceolate or oblong lanceolate, acute or shortly acuminate, cuspidate serrate, thinly coriaceous; lateral nerves 15-19 on either half, ends meeting near the margin and more or less contiguous, fine; nervules indistinct, straight, mostly subparallel; petiole very short; stipules .15 in. long, subulate, intrapetiolar. *Flowers* before the leaves, in few flowered corymbs, mostly at the ends of short

lateral woody branches ; pedicels .5-1 in. long, jointed near the base. *Sepals* 5, obtuse-oblong, about .5 in. long. *Petals* '6-9 by '25-4 in., obovate, clawed. *Filaments* a little shorter than the anthers or equalling them. *Drupels* 3-5 on a large hemispheric disk, reticulate when dry. *Fruiting sepals* reflexed, reddish, purple, coriaceous.

GARO HILLS near Tura, Rongrengiri reserve, Songsak road ;

CACHAR—Katakhal Forests—Mann ! SYLHET, Brandis.

Wood is used for rice pounders.

Frs. when leafless 3-4 ?

2. *Ochna squarrosa* Linn.

A small subdeciduous tree or shrub ; branchlets annulate with scars of fallen bud scales. *Leaves* 2.5-5 by 1-2 in., obovate, elliptic or oblanceolate, acute usually at both ends, firmly coriaceous or subcoriaceous, remotely but sharply serrate ; petiole .15-.2 in. long, stouter than in *O. Wallichii* ; stipules .15-.25 in. *Flowers* while the leaves are still on, fragrant, from ends of short lateral branches or scars of fallen leaves, in corymbose racemes ; pedicels 1-1.5 in. (stouter than in last sp.) long. *Sepals* .5-.7 in. long. *Petals* 5-12, as long as sepals, or a little longer, clawed ; anthers several times longer than the filaments, .3-.4 in. long ; filaments minute ; lobes of disk ridged. *Drupels* .3 in. long. *Fruiting sepals* erect.

KHASI HILLS, SYLHET—Clarke (!) GARO HILLS, Rongrengiri.

Flowers 3-4. Fr. 5-6,

3. *Ochna pumila* Ham.

An undershrub usually with annual shoots from a perennial woody root-stock. *Leaves* 3.5-6 by 1.3-2 in., oblanceolate or obovate, obtuse or subacute at apex, spinous serrulate, coriaceous ; lateral nerves 10-12 on either half, fine, slightly raised, tapering to a short petiole ; stipules .25-.3 in. long, lanceolate, margins toothed. *Flowers* bright yellow, 1.5-2 in. across, fragrant, few together, subumbellate at the ends of long axillary and terminal peduncles, 2-3 in. long ; pedicels .7-1.5 in. long, joined below the middle. *Sepals* up to .5 in. long, elliptic-oblong. *Petals* yellow, delicate, obovate, much exceeding the sepals ; filaments a little shorter than or equalling the anthers ; style with 4 linear segments near the top. *Drupels* up to .5 in. long, greenish when ripe.

LOWER ASSAM—Mann ! ASSAM—Fisher !

Flowers 3-5. Fr. rainy season.

FAM. 33. BURSERACEÆ.

Resinous trees or erect shrubs. *Leaves* alternate, usually imparipinnate in the Genera described here, generally exstipulate. *Flowers* small, 2-sexual or polygamous. *Calyx* free, 3-7 cleft, valvate or imbricate. *Petals* 3-7, usually distinct. *Disk* annular or cup-shaped. *Stamens* as many or twice as many as the petals; filaments usually free, inserted on the margin or outside at the base of the disk; anthers 2-celled. *Ovary* free, 2-5 celled, with 2-axile pendulous ovules in each cell; style simple. *Fruit* a drupe, either with 1-5 pyrenes or with a 1-3 celled and 1-3 seeded stone. *Seeds* exalbuminous.

Calyx lobes 5, stones 1-celled, 1-seeded:—

Flowers terminal or at the ends of branches; disk lining the calyx tube.

.. 1. *Garuga*.

Flowers axillary or from axils of fallen leaves; disk annular.

.. 2. *Bursera*.

Calyx lobes 3; stones 3-celled, usually 1-2 seeded.

.. 3. *Canarium*.

1. GARUGA Roxb.

Middle-sized or large trees; branchlets pubescent when young. *Leaves* exstipulate, crowded towards the ends of branches; leaflets opposite, subsessile. *Flowers* polygamous in much branched panicles. *Calyx* campanulate, 5-fid, valvate, clothed within by the large, but thin, crenate disk. *Petals* 5, inserted on the tube of the calyx, induplicate-valvate. *Stamens* 10, equal, in 2 series, inserted at the mouth of the hollowed disk. *Ovary* sessile, ovoid, 4-5 celled; style erect; stigma capitate. *Fruit* a globose fleshy drupe with 1-5, 1-seeded pyrenes. *Seeds* with a membranous testa; albumen 0; cotyledons contorted.

Leaflets turning red before falling. Panicles usually under 9 in., not slender. Calyx deciduous. Ovary usually tomentose. Drupe .5-1 in. diam.

... 1. *G. Pinnata*.

Leaflets turning yellow before falling. Panicles up to 16 in., slender. Calyx persistent. Ovary usually glabrous or nearly so. Drupe under .2 in. diam.

... 2. *G. Gambelii*.

1. *Garuga pinnata* Roxb. Vern. *Thotmola*, *Rohimola*, *Thotmela*, Ass.; *Kechkechi*, Ass. (Darr.); *Pani-amora*, Ass. (Sib.); *Rohimala*, Ass. (Nowg.); *Tejhi-arong*, *Timur*, Mik.; *Bonkrung-asing*, *Miri*; *Bonthai-phang*, *Rouni-poma*, Kach.; *Sibon-asing*, Abor; *Thing-rot*, *Kuki*; *Chigambol*, *Chidampha*, *Dumi*, *Agri*, *Garó*; *Toisim-taito*, *Bombus*, *Bombuk*, *Tipp.*; *Sri-amla*, *Pahari-jiga*, *Jharua*; *Engla*, *Hengela*, Sylh.; *Dabdabi*, Nep., *Dieng-khiang*, *Khasi*; *Dieng-soh-pyjiar-synrang*, *Dieng-soh-khmut*, *Khasi* (Umling).

Usually a middle-sized deciduous tree. *Bark* grey or brown outside up to 1 in. thick, generally rough and exfoliating in round

hard flakes; blaze red or deep-pink, somewhat aromatic, often with distant streaks of white tissue; young parts and inflorescence pubescent. *Leaves* 9-18 in. long. *Leaflets* 11-19, variable in size, 2-6 by 1-1.7 in., oblong- or ovate-lanceolate, somewhat oblique, caudate-acuminate, turning red before falling, crenate, subcoriaceous, more or less pubescent, especially beneath, often invested with large reddish galls; lateral nerves about 18 on either half, straight, often almost transverse; base oblique; petiolule 1-1.5 in. long or 0. *Flowers* greenish-yellow, 15-25 in. long, in cymes arranged in large terminal panicles usually up to 9 in. long before or with the leaves; bracts linear, deciduous; pedicels up to .2 in. long, tomentose. *Calyx* campanulate, green; segments triangular or ovate, valvate. *Petals* 5, yellow, linear or oblong, acute, alternating with the calyx-segments and twice as long, tomentose outside. *Filaments* hairy as also are the ovary and style; stigma capitate, 4-5 lobed. *Drupe* irregularly globose, 5-1 in. across; pyrenes 2-3.

Throughout the province, chiefly in deciduous or open forests, ascending to about 2500 ft.

The heartwood is reddish-brown and has a reputation for durability. Weight about 40 lbs. per c. ft. The bark may be used for tanning and the leaves are good fodder for buffaloes. The tree can be grown from cuttings.

Leafless 2-5. Flrs. 3-4. Fr. 5-12.

A form with leaves about 2 ft. or more in length; leaflets attaining 8.2 by 3.5 in. more pubescent than in the type, and inflorescence attaining 20 in. has been collected by Mr. C. Purkayastha from Dibru Reserve, Lakhimpur. This form which has been recorded also from Jalpaiguri (R. C. Sircar !), Sibsagar (Peal !), Tounegoo (C. S. Rogers No. 210 !), Kachin Hills (Pottinger !); has not been separated in the Calcutta Herbarium. Further observation is needed for determining its position.

2. *Garuga Gamblei* King (W. W. Smith). Rec. Bot. Surv. Ind. iv. 262. Vern. *Bon-misri*, (also *Bonthai-phang*), Kach.; *Bankung-asing*, Miri; also most of the other names for *G. pinnata*.

A very large tree up to 10 ft. in girth and up to 70 ft. to the lowest branch with a spreading crown, often buttressed at the base. *Bark* ashy-grey and nearly smooth outside except for faint vertical fissures and scattered warts, exfoliating in irregular flakes; inside uniformly reddish-brown or light red in thin concentric layers, fibrous, often with broad streaks of firmer tissue of brown colour, 3-5 in. thick, not aromatic; young parts puberulous. *Leaves* alternate, generally imparipinnate, 12-18 in. long, exstipulate; rachis pubescent when young, afterwards glabrous. *Leaflets* 13-17, 2-6 by 1-2 in., subsessile or on petiolules up to 1 in. long, ovate-oblong or oblong-lanceolate, caudate acuminate, crenate-serrate, membranous, sparsely pubescent when young, afterwards glabrous, turning yellow before falling; lateral nerves up to 20 on either half, arching; base oblique, the upper half beginning from opposite the second nerve of the lower half. *Panicles* on extremities of leafless branchlets, 8-12 in. long, lengthening in fruit up to about 16 in. with racemose branches and cymose branchlets; rachis pubescent, but ultimately glabrous

towards the base; bracteoles '15-3 in. long, lower 3-lobed, deciduous. *Flowers* small, about .2 in. across; pedicels up to '1 in. long. *Calyx* glabrous inside, minutely tomentose or puberulous outside; lobes 5, triangular, persistent in fruit. *Petals* 5, ovate, about '1 in. long, glabrous inside. *Stamens* 10, inserted on the margin of the disk; filaments glabrous. *Ovary* 5-celled, glabrous or minutely pubescent; style '15 in. long, stout, glabrous. *Drupe* '15-2 in. across, generally with 1-2 woody pyrenes.

Sporadic in hilly tracts and in the vicinity of hills up to 3000 ft., e.g., N. E. F. DISTRICT; Charduar Reserve in DARRANG; Sonaikusi reserve—NOWGONG; Dalu, GARO HILLS; Nongpoh, KHASI HILLS.

Leafless 1-4. Flrs. 3-4. Fr. 5-6-12.

The tree has probably the same economic uses as *Garuga pinnata*. Wood grey, with large pores and fine equidistant medullary rays; weight about 40 lbs. per c. ft., heartwood not seen.

2. BURSERA Linn.

Bursera serrata Colebr. *Neoli*, Mech; *Mirtenga*, Ass. (Kam.); *Bil*, Lushai; *Engla* or *Hengla*, Cach; *Thikring*, Garo; *Nihor*, Tharua; *Kasianthor-arong*, Kichejanthar, Mik.; *Dieng-soh-mir*, Kh.

A medium sized or large tree. *Bark* brownish or light grey outside exfoliating in irregular flakes, inside pink changing to reddish brown, softly fibrous, about '75 in. thick; young parts pubescent. *Leaves* alternate, imparipinnate; rachis 7-14 in. long, terete, pubescent. *Leaflets* 5-11, opposite, '3-5'5 by 1-5-2 in., ovate to oblong, sometimes elliptic-lanceolate, somewhat bluntly caudate, almost entire to coarsely serrate, coriaceous, pubescent when young, ultimately glabrous above, thinly pubescent or glabrate beneath; lateral nerves 8-14, prominent beneath, arcuate, upper meeting in loops near the margin; base oblique, narrowed or rounded; petiolules '3-7 in., usually swollen both at apex and base. *Flowers* small, about '1 in. across, green, hermaphrodite, pentamerous in lax panicles from leaf axils or axils of fallen leaves and shorter than the leaves; pedicels short. *Calyx* small; lobes rounded, pubescent externally. *Petals* valvate in bud, ovate oblong, acute, pubescent outside; stamens 10, nearly equal. *Disk* annular, crenate. *Ovary* hairy surrounded by the disk; stigma sessile or subsessile. *Drupe*s on thick peduncles, '5-75 in. across, 2-3 furrowed; exocarp bright pink, inside with 1-3 stones in white soft, pleasantly acid, edible pulp.

KAMRUP, CACHAR, NOWGONG, GARO HILLS, LUSHAI HILLS, GOAL-PARA, and KHASI HILLS—at the foot; probably all over the province. Gregarious in some places e.g. Tepaimukh.

Wood hard, sapwood light brown, heartwood red, close grained, "medullary rays fine, making a good silver grain"—Gamble.

It is said to be an excellent wood for furniture. The fruit is eaten. It coppices well.

Flrs. 3-4. Fr. .

3. CANARIUM Linn.

Large resinous trees. *Leaves* alternate, imparipinnate, stipulate or exstipulate. *Flowers* bracteate, 2-sexual or polygamous. *Calyx* valvate, cup-shaped or urn-shaped, persistent, 3-lobed. *Petals* 3-5, imbricate or valvate, usually exceeding the calyx, inserted outside the disk. *Stamens* usually 6, free and inserted on the disk, monadelphous and distinct from the disk. *Ovary* usually 3-celled; style short or stigma subsessile; in male flowers reduced to a pistillode. *Drupe* more or less trigonous, containing a single bony 3-celled stone, usually with one seed, rarely with two (one each in two of the cells); testa thin; cotyledons often divided, very oily.

Leaflets entire, thinly coriaceous, glabrous at least when mature.

.. 1. *C. bengalense*.

Leaflets serrulate, thickly coriaceous, ferruginous-tomentose even when fully mature.

.. 2. *C. resiniferum*.

1. **Canarium bengalense** Roxb. Vern. *Komker-asing*, Miri & Abor; *Dhuma* Ass.; *Hjung-arong*, Inghet-ki-ik-arong, Mikir; *Gokul*, Nep.; *Borsamphol*, Garo; *Satrai-phang*, Cach.

Generally a middle-sized tree but at times a lofty one up to 12 ft. in. girth. *Bark* exfoliating in thin irregular flakes, 7 in. thick; inside light yellowish-brown to reddish-brown according to age, mottled with streaks of darker brown or pink; extremities of branches rusty pubescent, otherwise glabrous. *Leaves* 1-3 ft. long, more or less crowded at the ends of the branchlets; stipules subulate. *Leaflets* generally 13-15, sometimes up to 21, 3-9 by 1-3 in., opposite or subopposite, ovate-oblong, lanceolate, rather bluntly acuminate, entire, thinly coriaceous, glabrous and shining above, almost with a metallic lustre when dry, thinly pubescent when young but soon glabrescent beneath; lateral nerves generally 10-15, sometimes up to 20, on either half, prominent beneath, tertiary and quaternaries closely reticulate; base oblique; petiolule 1-15 in. long, terete, stout. *Flowers* in narrow axillary or supra-axillary raceme-like panicles up to 15 in. long, thinly pubescent; buds oblong; pedicels short, about 3 in. long. *Calyx* cup-shaped with three broad teeth, fleshy. *Petals* 3, obovate-oblong. *Disk* 3-lobed, concave, hirsute. *Filaments* connate, half way up. *Drupe* 1.3-1.7 in. long, ellipsoid, pruinose; mesocarp fleshy, aromatic; stone 3-gonous, usually 3-celled, 1-2 seeded.

Fairly common in evergreen forests throughout ASSAM, ascending to 3000 ft., in KHASI HILLS.

The wood is very open-grained and evidently not strong. But it does not warp and seems to be suitable for tea boxes. Weight 39 lbs. per c. ft. A clear amber-like resin exudes from wounds in the bark, which is burnt as an incense.

Flrs. 5-7. Fr. 11-1.

2. **Canarium resiniferum** Brace, King in Journ. As. Soc. Beng. Vol. 62 (1893). Vern. *Silum-pakia*, Abor and Miri; *Dhuma*, Ass.; *Satrai-phang*, Kach.; *Mekruk*, Manip.; *Bero-thing*, Kuki;

Beroh, Lush. and Kuki; *Hijung*, Mikir; *Bero-rata*, Tipp.; *Berirata*, Sylh.; *Bot-sasat*, Dong-kh reng, Garo.

A gigantic * tree buttressed at the base and with a spherical crown after height growth is completed. *Bark* light-greenish grey outside, exfoliating in long hanging and over-lapping flakes, about .5 in. thick; vivid green underneath the cuticle, inside brown or reddish brown, fibrous, hard but brittle, somewhat aromatic. *Leaves* 1-2 ft. long; rachis sub-sulcate. *Leaflets* 3-13, opposite or subopposite, 3.5-8 by 1.5-4 in., ovate to oblong-lanceolate, sometimes obovate to oblanceolate or elliptic, somewhat abruptly and obtusely acuminate, finely serrulate or crenulate, tough and coriaceous, glabrous and shining above, ferruginous tomentose or tardily glabrate beneath; lateral nerves 10-24 on either side of the midrib, rather abruptly arched towards the extremity, very prominent beneath; tertiaries transverse and parallel; quaternaries very finely reticulated; base usually rounded, more or less oblique; petioles .1-2.5 in. long. *Panicles* supra-axillary, 12-15 in. long with a peduncle half its length; branches short, cyme bearing, densely ferruginous-tomentose; pedicels short; buds elongate. *Calyx* about .1 in. long, cup-shaped, with 3 shallow and rounded teeth, tomentose outside. *Petals* 3, oblong, .2-.3 in. long, overlapping to the left. *Stamens* connate into a tube half way up, enclosing the very bristly disk. *Drupe* up to 2 by .8 in., almost exactly like that of *C. bengalense* but generally more pointed at both ends.

Not common; on lower hills or on plateaus throughout the province.

The bark exudes a blackish tar-like resin which finds its way in the markets in large round lumps. Bees often gather it before it hardens (for their hives?).

Flrs. 6-7. Fr. cold season.

A closely allied form—*Silampakiak*, Miri—my sheet 3203 collected at Pasighat N. E. Frontier may perhaps be *C. strictum Roxb.* or an intermediate form, but material at my disposal is insufficient for correct determination. It is a lofty tree with bark exfoliating in overlapping plates, and brown blaze with bands of light red; the leaflets are mostly tomentose beneath.

***Balsamodendron Roxburghii*, Arn.** A small resinous tree; branchlets often ending in spines. *Leaves* alternate, 1-3 foliolate; leaflets 1-2.5 by .5-1.2 in., oblanceolate or spatulate, closely serrate with 6-7 fine lateral nerves; base tapering to the petiole which is .2-.3 in. long. *Flowers* and *fruits* not seen.

There is one poor specimen with leaves only in Calcutta herbarium and none from our area.

It is said to occur in SYLHET and ASSAM according to Hooker and should be looked for.

* A tree 150 ft. high, 90 ft. up to the lowest branch and 14 ft. 4 in. girth was measured in December 1915.

FAM. 34. MELIACEÆ.

Trees or erect shrubs. *Leaves* alternate, normally pinnate; leaflets generally oblique at the base; stipules 0. *Flowers* regular, generally 2-sexual, in panicle cymes. *Calyx* small, 3-6 lobed; lobes generally imbricate in bud. *Petals* 3-6, usually free, imbricate. *Stamens* as many, or more frequently twice as many as the petals; filaments generally connate into a tube, rarely free; anthers 2-celled, introrse, erect, usually sessile on the tube, included or excluded. *Disk* surrounding the ovary and often adnate to it, annular or tubular. *Ovary* 3-5 celled; style simple or stigma sessile; ovules generally two in each cell, collateral or superposed, rarely solitary or numerous. *Fruit* a drupe, capsule or berry; seeds often arillate, with or without albumen; radicle superior.

- I. Ovules 1-2 in each cell; seeds not winged :—
 - A. Fruit drupaceous; leaflets generally serrate :—
 Leaves pinnate. .. 1. Azadirachta.
 Leaves 2-3 pinnate. .. 2. Melia.
 - B. Fruit capsular or baccate; leaflets entire or nearly so :—
 1. Fruit capsular :—
 - a. Filaments free towards the apex; disk annular. .. 3. Heynea.
 - b. Filaments completely united :—
 - i. Staminal tube linear or oblong; style long; petals 4-5; ovary 3-4 celled :—
 * Trees; petals free; anthers more or less included in the staminal tube :—
 Flowers bisexual; anthers short; ovules 2 in each cell. .. 4. Dysoxylum.
 Flowers polygamous; anthers long; ovule 1 in each cell. .. 5. Chisocheton.
 ** Undershrub; petals united about half way; anthers exerted. Flowers bisexual. .. 6. Munronia.
 - ii. Staminal tube globose; style 0*; petals 3, ovary 3-celled; anthers included. .. 7. Amoora.
 2. Fruit a berry :—
 Anthers 5, included in the more or less globose staminal tube; style 0. .. 8. Aglaia.
 Anthers 10, exerted; filaments free or nearly so; style present. .. 9. Walsura.
- II. Ovules many in each cell; seeds winged; fruit capsular :—
 Filaments connate into a cylindrical tube; disk 0; capsule 3-celled; seeds packed transversely in each cell. .. 10. Chickrassia.
 Filaments free; disk conspicuous; capsule 5-celled; seeds packed lengthwise in each cell. .. 11. Cedrela.

* Assam species.

1. AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. Syn. *Melia Azadirachta* Linn.
F. B. I. *Melia indica* Brandis For. Flor. Vern. Nim, Ass.; Beng.
Nimba, Sans.

A well known large to middle sized handsome tree, sometimes planted in homesteads and found as escape throughout the plains of Assam. *Leaves* imparipinnate, 9-15 in. long, crowded towards the ends of branches; rachis glabrous. *Leaflets* 9-15, terminal, often aborted, subopposite, 2-4 by 1-1 in., obliquely lanceolate to ovate-lanceolate or falcate, very unequal sided, gradually acuminate, coarsely serrate, glabrous, dark green and shining above; petiolules very short. *Flowers* white, about 4 in. across, scented, in axillary lax, glabrous, panicles, shorter than or as long as the leaves. *Calyx* small, 5-fid, divided almost to the base; segments broad, rounded. *Petals* 5, about 2 in. long, spreading, oblong-spathulate, ciliolate, pubescent inside along the middle; staminal tube dilated at the base and apex, usually pubescent inside near the top, 10-12 toothed. *Anthers* inserted inside the staminal tube, opposite the teeth. *Ovary* flask-shaped, 3-celled; style as long as staminal tube, expanded into the 3-lobed fleshy stigma. *Drupe* 5-7 in. long, ovoid, oblong, 1-celled, 1-seeded, smooth, greenish-yellow, when ripe.

Heartwood dark-red, very hard, weighing about 50 lbs. per c. ft., good for turniture. It makes good sonorous drums. In Assam, however, the tree is chiefly valued for its bark and leaves which are used in medicine. An oil is expressed from the pulp of the fruit, which is valued for its antiseptic properties and considered to be very good for small pox and sores in general.
Flrs. 3-4. Fr. 7-8.

2. MELIA Linn.

Middle-sized or large trees. *Leaves* 2-3 pinnate. *Flowers* in large much-branched axillary panicles. *Calyx* small, 5-6 lobed, imbricate. *Petals* 5-6, free, convolute in bud. *Disk* annular. *Stamens* 10-12, united in a cylindrical tube dilated below and above, striate, toothed at the edge; anthers inserted on or near the mouth of the tube. *Ovary* 3-6 celled with two superposed ovules in each cell; style slender; stigma capitate, deciduous. *Fruit* a dry or fleshy 1-5 celled drupe; seed solitary in each cell, pendulous.

- I. Branchlets thin; leaves 2-pinnate; staminal tube slender, purple, glabrous, suddenly expanded at mouth. .. 1. *M. Azedarach*.
- II. Branchlets stout; leaves 2-3 pinnate; staminal tube stout, more or less hairy, not suddenly expanded:—
 - Leaflets on fairly long slender petiolules; reticulations fine but distinct; staminal tube with 10 bi-fid teeth. .. 2. *M. composita*.
 - Leaflets on very short winged petiolules; reticulations indistinct; staminal tube with at least 30 teeth. .. 3. *M. superba*.

1. *Melia Azedarach* Linn. Vern. *Abari-asing*, Miri and Abor; *Thai-mado* or *Themdou-phang*, Kach.; *Nim-tita-arong*, Milk.; *Bokain*, Hin.; *Ghora-nim*, *Mahanim* Beng & Ass.; *Dieng-jah-rasang*, Khasi.

Usually a small or middle-sized deciduous tree* with a short trunk and large spreading crown; branchlets slender; young parts and inflorescence covered with stellate scurfy hairs; bark greenish brown and smooth but lenticellate on young stems; dark-grey, exfoliating in rectangular pieces and about 5 in. thick on mature trees; blaze dark-brown. *Leaves* 10-20 in. long, 2-pinnate, rarely 3-pinnate by a few leaflets of the lowest pinnæ being further subdivided; pinnæ 5-9. *Leaflets* 3-7 on each pinna, 5-2 by 3-1 in., somewhat obliquely ovate-lanceolate, acuminate, unequally serrate or sometimes lobed, membranous; petiolules 1-2 in., slightly margined, those of terminal leaflets longest. *Flowers* lilac-blue, up to 4 in. long, in numerous axillary cyme bearing panicles; peduncles 3-4 in. long, ultimately glabrous; ramifications slender; pedicels 0-3 in. long, very slender; bracts and bracteoles minute. *Calyx* deeply 5-lobed, stellate-tomentose; lobes elliptic to ovate-oblong. *Petals* 5, 2-3 in. long, linear-oblong or oblanceolate, with a faint midrib, pubescent outside when young. *Staminal-tube* 2 in. long, purple, cylindrical, longitudinally ribbed, glabrous, suddenly expanded at the apex with 20-30 linear teeth with 10-12 apiculate anthers at their base. *Ovary* 5-celled; stigma capitate. *Drupe* 5-6 in. across, globose, generally 5-celled and 5-seeded, yellow when ripe, at first quite smooth but wrinkled in drying, remaining long on the tree after ripening.

Fairly common, especially under cultivation in tea gardens, where it is often planted for firewood, as it grows very fast, and coppices extremely well.

Heart-wood reddish brown and takes a good polish; weight about 40 lbs. per c. ft. The bark is very bitter and is used as an anthelmintic. The leaves also have medicinal properties and are lopped for fodder.

Leafless 12-5. Fl. 3-5. Fr. cold season.

2. *Melia composita* Willd. incl. *M. Toosandan*, Sieb. et Zucc. Syn. *M. dubia*, *F.B.I.* Vern. same as of the preceding species,—also the following:—*Hanti-pi-arong*, *Han-hodak*, Mik.; *Kerewal*, Kuki; *Aming-gok*, *Gingsimok* or *Gingsinmok*, Garo; *Dieng-jarasang*, *Soh-dieng-lang*, Khasi.

A fairly large deciduous tree up to 65 ft. in height and 6 ft. in girth. Bark blackish and with close vertical fissures outside, creamy white or very light-brown inside; young shoots and inflorescence covered with scurfy stellate tomentum; branchlets stout, speckled with raised round lenticels. *Leaves* 1-2 ft. long, 2-3 pinnate; pinnæ 3-5 pairs; rachis terete. *Leaflets* 5-11 or 3;

* A tree 50 ft. in height and 6 ft. 7 in. in girth was measured on 25th March 1914 in front of the Inspection Bungalow at North Lakhimpur.

petiolulate, ovate-lanceolate to ovate round, acuminate often more or less oblique at the base, serrate or entire, membranous, glabrescent with age; main lateral nerves 6-10 on either side of the midrib, sub-horizontal; nervules finely reticulate; petiolules up to 3 in., those of the terminal leaflets usually longest. *Panicles* 5-7 in. long, many flowered. *Flowers* 3-35 in. long, white or light mauve, inodorous. *Calyx* 5-partite, tomentose; lobes ovate-oblong. *Petals* linear-spathulate, concave, pubescent outside, puberulous inside. *Staminal tube* white, gibbous at the base, slightly expanded at the apex, with 10 bifid teeth, nearly glabrous or pubescent inside; anthers sessile, inserted behind the teeth. *Style* as long as the staminal tube; stigma large, globose 5-toothed. *Drupe* 8-12 by 7-9 in., smooth but speckled with raised round dark-brown dots; stone perforated at both ends, deeply lobed at the apex, 5-7 celled, 1-6 seeded; seeds lanceolate, with a black shining testa; cotyledons oily.

Throughout UPPER ASSAM ascending to about 5000-ft. in KHASI HILLS in deciduous tracts, not very common.

Economic uses same as of the last species.

Leafless 12-5. Firs. 3-4. Fr. ripens 12-2.

3. *Melia superba* Roxb. Syn. *M. birmanica* Kurz. Vern. same as of the preceding species.

A large tree supposed to differ from the foregoing species by having larger leaves, ovate or ovate-cordate, obscurely reticulate leaflets on winged petiolules, greenish-white; flowers with an offensive smell, 10-ribbed, wooly staminal column and a globose smooth fleshy drupe. Other characters are more or less identical.

Hardly a different species.

Found in the same localities as, and very liable to be mistaken for, *M. composita*.

3. HEYNEA Roxb

Heynea trijuga Roxb. Vern. *Theng-are-arong*, Mik.; *Rolang-phang*, *Rathang-phang*, Cach.; *Komal-siuli*, Nep.; *Khag-man-chhi*, Tipp.

A handsome tree up to 40 ft. in height and 3 ft. in girth, practically evergreen; young parts pubescent; bark dark-brown, vertically furrowed, rough, bright-red underneath the thick corky layer, 3 in. thick, inside very 'cheesy,' in extremely fine concentric layers which are more or less wavy or even looped at intervals. *Leaves* alternate, somewhat crowded at the ends of branchlets, imparipinnate, having a bitter taste, 9-15 in. long; rachis terete, jointed at the nodes; leaflets 5-11, usually 7, the lateral opposite, 2-6 by 1-3.5 in., terminal largest, ovate-oblong or lanceolate, acuminate, oblique at the base, entire, membranous, dark-green and glabrous above, pale or glaucous, sometimes pubescent beneath; lateral nerves 10-14 on either side of the

midrib, anastomosing towards the outer extremity, the lowest pair or two sub-basal; nervules very fine and elegantly reticulate; petiolules 3-8 in. long. *Panicles* axillary, 9-12 in. long including the 5-7 in. long peduncle, corymbosely branched, with small subulate bracteoles at the base of ramifications, extremities bearing short cymes, pubescent. *Flowers* white, about 2 in. across; buds globose; pedicels short. *Calyx* small, usually 5-fid, hairy outside, broadly ovate. *Petals* usually 5, puberulous outside, suberect, narrowly imbricate, margins finely ciliolate. *Staminal-tube* short, 8-10 lobed; lobes bifid, yellow, hairy within, alternately slightly shorter; anthers apiculate, inserted between the clefts of lobes. *Disk* fleshy, annulate. *Ovary* sunk in the disk, 2-3 celled with two ovules in each cell; style short, dilated upwards; stigma bluntly 2-fid with a thickened discoid base. *Capsule* about 5 in across, globose, splitting into two valves, remaining long on the tree after splitting; seed solitary, with a thin white aril, exalbuminous; testa brown, turning almost black, shining.

DARRANG in UPPER ASSAM, fairly common in the NORTH CACHAR and JAINTIA HILLS, also sal forests in NOWGONG, e. g., Kholahat Reserve ascending to about 2000 ft.

Wood grey, moderately hard, fine grained, weighing about 55 lbs., per c. ft., suitable for posts and agricultural implements. The seeds give an oil which can be burnt in lamps.

Flrs. 1-5. Fr. 9-1.

4. DYSOXYLUM BL.

Trees, often with a garlic-like smell. *Leaves* pinnate; leaflets opposite or alternate, entire, acuminate, more or less oblique at the base. *Flowers* hermaphrodite, in lax axillary panicles of cymes. *Calyx* 4-5-fid, open in bud. *Petals* 4-5, oblong, spreading. *Staminal column* cylindrical, toothed at the mouth; anthers 6-10, small, inserted below the edge of the staminal tube. *Disk* tubular surrounding and often exceeding the ovary. *Ovary* hairy, free, 3-4 celled, usually with two ovules in each cell, narrowed into a long style; stigma broadly capitate. *Capsule* pear-shaped or globose, coriaceous, loculicidally 1-4 celled; seeds exalbuminous, sometimes arillate.

I. Panicles spreading. Leaflets opposite or alternate:-

A. Disk densely hairy at the mouth; leaflets glabrous; capsule usually up to 2 in. across. .. 1. *D. procerum*.

B. Disk glabrous at the mouth:-
 Leaflets opposite, glabrescent beneath; capsule less than 1 in. in length. .. 2. *D. Hamiltonii*.
 Leaflets alternate, velvety beneath; capsule 2 in. or more in length. .. 3. *D. grande*.

II. Panicles narrow, racemiform or spicate. Leaflets alternate:-

A. Calyx bowl-shaped, sub-entire:-
 Leaflets glabrous, obliquely broad ovate; tertiary nerves indistinct. .. 4. *D. binectariferum*.

B. Calyx cup-shaped, deeply lobed :-

Leaflets broad ovate-oblong; tertiary nerves indistinct; disk glabrous both outside and inside, capsule pubescent. Leaflets narrowly oblong or lanceolate; tertiary nerves strongly reticulate; disk glandular-pubescent.

.. 5. *D. pailens*... 6. *D. reticulatum*.

1. *Dysoxylum procerum* Hiern. Vern. *Katum-asing*, Abor; *Galing-libor*, Miri & Abor; *Khrang*, Mik.; *Amari*, Lali, Ass.; *Kasshot*, *Thing-tupui*, Kuki (N. C. Hills) & Lushai; *Ratasahatta*, Lushai; *Thakhai-phang*, Cach.; *Patamari*, Mech.; *Bol-chhachhat*, Garo, *Chachat*, *Bol-sachat*, *Makharibo*, Garo.

A fairly large tree; bark greenish-grey or greyish-brown, fairly plain up to middle age, afterwards somewhat rough with distant irregular scales, inside pink or reddish-brown with distant white streaks, exuding white milky resin; young shoots slightly pubescent. *Leaves* 1.5-2 ft. long, pari- or impari-pinnate; rachis terete; leaflets 7-13, opposite or alternate, 6-12 by 2.5-4.5 in., obovate or elliptic-oblong, slightly oblique at the base, thinly coriaceous, glabrous; lateral nerves 12-16 on either side of the midrib; petiolules stout, .2-5 in. long. *Panicles* erect, stiff, 12-26 in. long with short horizontal puberulous branches; bracts subulate; pedicels very short, bracteolate; buds pubescent. *Flowers* .3-5 in. long, cream-white, fragrant. *Calyx* pubescent; lobes acute, short. *Petals* 4, oblong, valvate. *Anthers* 8, subsessile. *Disk* about one-third to two-thirds the length of the staminal tube, hairy at the mouth, encircling the hairy ovary; style slightly exceeding the staminal tube. *Capsule* up to 2.5 in. long, pyriform; seeds 2-3, black and shining with an orange aril.

Fairly common throughout the province, especially in the evergreen forests of UPPER ASSAM. Heartwood bright red, weighing about 40 lbs per c. ft., much used for doors and windows.

Firs. 12-1. Fr. 5-7.

2. *Dysoxylum Hamiltonii* Hiern. Vern. *Gendheli-poma*, Up. Ass.; *Keotai*, Ass. (Darr.); *Siti-asing*, Miri; *Situk-payu*, Abor; *Mauhidat*, Cach.; *Thing-saphu*, *Inthet*, Kuki; *Bol-asin*, Garo; *Dieng-kyrbei*, Khasi.

A fairly large evergreen tree; bark splits from below and thus overlaps like scales, dark-brown outside, pale-brown or whitish inside with reddish-brown streaks strongly smelling of garlic. *Leaves* 1.5-2.5 ft. long, suberect, generally paripinnate; rachis terete; leaflets usually 10-18, but on young poles up to 42, opposite or subopposite, drooping, 4-6 by 1.5-2 in., oblong to oblong elliptic, subfalcate, caudate acuminate, oblique at the base, membranous, glabrous or hairy beneath, smelling of garlic when bruised, turning pale-yellow when old; lateral nerves 12 on either side of the midrib, slender, dilated at the base and slightly concurrent with the midrib. *Panicles* about 6-9 in. long with puberulous branches; bracts and bracteoles minute; pedicels

slender up to 1 in. long. *Flowers* 4-merous, about .25 in. long, greenish-white. *Calyx* very small, pubescent. *Petals* 4, glabrous. *Staminal tube* pubescent, bearing 8 anthers. *Disk* glabrous, twice as long as the pubescent ovary. *Capsule* about 1 in. diam., globose, 4-celled, 4-seeded, pale-yellow or almost white, smelling very strongly of garlic; seeds with a pale or reddish aril.

N. E. F. DISTRICT, LAKHIMPUR, SIBSAGAR, CACHAR, Bhuban hill, DARRANG, NOWGONG, KHASI HILLS up to 2500 ft., SYLHET and GARO HILLS, not common.

Heartwood red, moderately hard; weighing about 40 lbs per c. ft., used for boats and house-building, said to be very durable. The fruit is greedily eaten by monkeys.

Flrs. 11-12. Fr. 1-2.

3. *Dysoxylum grande* Hiern. Vern. *Boga-banderdim*, Ass.

A middle-sized tree; bark thin, dark-grey, fairly smooth outside; young shoots including leaves and inflorescence covered with velvety greyish tomentum. *Leaves* 1.5-2 ft. long; common petiole flattened or slightly channelled near the base. *Leaflets* 12, alternate, 5-8 by 2-3 in., oblong, caudate acuminate, rounded at the base, chartaceous, glabrous or glabrescent above except along the midrib and lateral nerves, grey-velvety beneath; main lateral nerves 20-25 on either side of the midrib, rather straight; petiolules about .25 in. long. *Panicles* about as long as the leaves. *Flowers* 1.5-2 in. long, 4-merous, in small cymose clusters; pedicels slender, very short. *Calyx* very small, pubescent; lobes short, acute. *Petals* grey, pubescent outside. *Staminal-tube* thinly pubescent or glabrous outside, terminating in bifid teeth. *Disk* glabrous, exceeding the hairy ovary. *Capsule* 2 in. or more (?) in length, pyriform, glabrous, generally 1-seeded; seed ellipsoid about 1 in. long; testa dark-brown, shining.

Either rare or often mistaken for its other co-genera, Nambor forest, SIBSAGAR, SYLHET-Brace (!).

Wood weighs 47 lbs per c. ft. and is apparently put to the same uses as of the preceding species.

Flrs. Rainy season. Fr. 12-1?

4. *Dysoxylum binectariferum* Hk. f. et Bedd. Vern. *Galingasing*, Miri; *Bandardima*, Ass.; *Khrang-kelok-arong*, Khrang, Mikir; *Bon-dau-iung*, Rata, Cach.; *Kakso-kehal*, Kuki; *Heren-thak-chi-ching*, Naga; *Kaksok*, Tipp.; *Hota-rata* Sylh.; *Dingari-guphut*, Dingari, *Dingi-bomphang*, Mech.; *Bol-narang*, Masispel, Garo.

A tree up to 50 ft. in height and 4 ft. in girth; young shoots and inflorescence minutely pubescent; bark grey outside, nearly smooth and warty on young stems, afterwards with light vertical fissures and horizontal wrinkles peeling off in thin papery flakes, pale, yellowish brown inside, mottled with coarse strands of darker brown. *Leaves* 1-1.5 ft. long; leaflets 6-8, alternate, 3-7.5 by 1.5-3.5 in., obliquely ovate-oblong, short-usually abruptly

acuminate, entire or with obscure distant teeth, thinly coriaceous. glabrous and dark-green above, pale underneath; lateral nerves 5-10 on either side of the midrib, much arched; tertiary nerves invisible; petiolules 2-3 in. long, channelled. *Panicles* 9-15 in. long; branches short. *Flowers* pale-white, about 25 in. long, tetramerous. *Calyx* thick, cup-shaped, subentire, about half as long as petals. *Petals* velvety outside. *Staminal tube* mealy. *Disk* much exceeding the ovary, glabrous inside, 8-toothed; anthers 8. *Ovary* hairy. *Capsule* 2-2.5 in. long, globose with a narrowed base, smooth, at first pale-yellow, turning deep-orange, 4-celled, 4-seeded; seeds shining purple with a large yellow hilum; aril white; cotyledons green, plumule hairy.

Fairly common throughout the province up to 3000 ft. in the hills.

Wood red or reddish grey, rough, weighing 44 lbs per c. ft., pores joined by wavy concentric lines of softer tissue.

It is made into planks and used for house building.

Flrs. 4-5. Fr. cold season.

5. *Dysoxylum pallens* Hiern. Vern. *Bandordima*, Ass., *Makhkaibo*, Garo.

A small tree with a spreading crown, somewhat resembling *D. binectariferum* in general appearance and foliage; bark dark-brown and plain outside, reddish brown with streaks of lighter colour inside. *Leaves* usually 1-2 ft. long; leaflets 6-10, alternate, 4-9 by 2-4 in., oblong or ovate-oblong, apex shortly but somewhat abruptly tailed, thinly coriaceous, oblique at the base, glabrous; lateral nerves 15-20 on either side of the midrib, arched, slender but prominent; tertiary nerves indistinct; petiolules 2-2.5 in. long, stout. *Racemes* spike-like, 1-10 in. long, puberulous; pedicels about 1 in. long, stout. *Flowers* greenish-white, sweet-scented, 2-3 in. long. *Calyx* cup-shaped, deeply 4- (rarely 5)-lobed, puberulous. *Petals* 4, rarely 5, thick, valvate, pubescent outside. *Staminal tube* and *disk* wholly glabrous, the latter scarcely exceeding the ovary, somewhat unevenly about 20-toothed. *Anthers* exserted. *Style* columnar. *Capsule* 1-1.5 in. diam., velvety outside.

UPPER ASSAM, e.g. LAKHIMPUR, SIBSAGAR and DARRANG.

The wood is not used as timber,

Flrs. 2-5.

6. *Dysoxylum reticulatum* King. Journ. As. Soc. Beng. Vol. 65 ii. 114. (1897). Vern. *Bandordima*, Ass.

A small tree up to about 35 ft. in height with a cylindrical straight trunk; bark grey and warty outside, hard and fibrous, pale yellow inside with golden-brown streaks. *Leaves* usually 1-1.5 ft. long, pale-green; rachis flattened above; leaflets about 14, alternate or subopposite, rarely opposite, 3-7 by 1.5-3 in., ovate or ovate-lanceolate, finely acuminate, chartaceous, glabrous; lateral nerves about 15 on either side of the midrib, arcuate, tertiaries conspicuous, subparallel, closely reticulate; base rounded or acute, unequal; petiolules 1.5-2 in. long. *Racemes* about

10 in. long. *Flowers* 4-merous, 25 in. long; buds ovoid. *Disk* fleshy, glandular-pubescent. *Capsule* 2.5-3 by 2-2.5 in., pyriform, yellow (drying dark-brown), verrucose, with numerous more prominently verrucose longitudinal ridges; seeds 1.2 by 1 in., cotyledons green.

LAKHIMPUR and SIBSAGAR Divisions, possibly also DARRANG.

Flrs. 4-5 (?), Fr. ripens 3-4.

5. CHISOCHETON* Bl.

Chisocheton paniculatus Hiern. Vern. *Bandordima*, Ass.; *Diengsoh-monashrieh*, *Dieng-mar-iony*, *Dieng-soh-khyllam-blung*, *Dieng soh-run-blung*, Kh.; *Rata*, *Thaikhukisin-bapang*, Cach.; *Khrankerarong*, *Theng-kippi*, Mik.; *Sahata-pui*, Kuki; *Masrusiphel*, *Makhaibo*, Garo; *Ratapangpa*, Tipp.; *Chota-Dingari*, Mech.

A small tree scarcely exceeding 40 ft. in height and 2.5 ft. in girth, with ascending branches and a narrow crown; young shoots and inflorescence brown hirsute; bark dark-brown outside, plain but warty, exfoliating in distant round flakes, often with white blotches (of lichen ?); inside light dun-brown oxidising to dirty purple on exposure. *Leaves* 2-4 ft. long, dark-green; rachis hairy; leaflets 7-33, opposite or subopposite, 3-10 by 1-4 in., oblong; ovate-oblong, or lanceolate, acuminate, entire, chartaceous, glabrescent above, thinly pubescent, especially along the nerves beneath; lateral nerves 7-13 on either half, obliquely arcuate, ends parallel to the leaf margin, prominent beneath; petiolules short. *Panicles* axillary, 2-3 ft. long, drooping with elongated lax branches. *Flowers* polygamous, pale yellow, 5-7 in. long, faintly scented, 4-merous; pedicels 1-5 in. long, articulated below the calyx; buds 5-6 in. long, club-shaped. *Calyx* small, cup-shaped, sub-truncate. *Petals* sharp-shaped, imbricate, minutely puberulous. *Staminal* tube white, as long as the petals, with 6-8 obscure bifid lobes, more or less pubescent; anthers 8, sessile, linear, included. *Disk* short, fleshy. *Ovary* 4-celled, each cell usually with one ovule; style slender, pubescent below, slightly exceeding the anthers. *Fruit* a capsule, 1.5-3 in. across, globose with a pyriform base, smooth and shining, dark orange or red; seeds black, shining with a white or yellow aril; endocarp fleshy.

Fairly common throughout the province ascending to about 3000 ft., the mature fruit hangs in long drooping bunches.

Wood yellowish, sometimes used for house posts.

Fls. 6-7. Fr. cold season.

6. MUNRONIA Wight.

Munronia Wallichii Wt. Vern. *Nolsing*, Garo.

An undershrub about 3 ft. in height; young shoots and inflorescence hirsute. *Leaves* crowded at the ends of the shoots,

* Also written Schizocheton.

alternate, imparipinnate, 5-12 in. long; rachis pubescent. *Leaflets* 7-9, opposite, 1-5 by 1-1.7 in., lanceolate or ovate to oblong-lanceolate, blunt acuminate, entire or obscurely sinuate, pubescent along the midrib and nerves beneath; lateral nerves 5-6 on either half, distant, arcuate; base rounded or narrowed, often oblique; petiolules of lateral leaflets short, of terminal leaflets up to 5 in. long. *Flowers* conspicuous, white or pale pink, hermaphrodite, hairy outside, few, clustered on axillary peduncles towards the ends of shoots; peduncles 4-7 in. long; pedicels 2-4 in. long; bracts linear, small. *Calyx* 5-partite; segments 25 in. long, oblong-spatulate, persistent and becoming red in fruit. *Petals* about 9 in. long, imbricate, narrow-spathulate, long clawed, claws cohering for most of their lengths. *Staminal tube* about 6-7 in. long, dilated upwards, 10 toothed at the apex, glabrous; anthers 10, terminal, alternating with the teeth, apiculate, pilose on the back along the connective. *Disk* membranous, tubular, entire, glabrous, enclosing the ovary and the base of the style. *Ovary* 5-celled, each cell 2-ovuled; ovules superposed; style slender, exceeding the staminal tube, lower half pilose; stigma capitate. *Capsule* 5-75 in. across, depressed, globose with uneven surface, hairy, bright red, loculicidally 5-valved, valves separating from the axis; seeds black, shining, plano-convex, not winged, hilum hollowed, with radiating lines; albumen thin.

GARO HILLS, KHASI HILLS ascending to 4400 ft.; in thick forest undergrowth.

Fls. & Fr. cold season.

7. AMOORA Roxb.

Trees generally with resinous milky juice. *Leaves* imparipinnate, exstipulate; leaflets opposite or alternate, quite entire, oblique. *Flowers* polygamous, as a rule 3-merous, male paniculate, female spicate or racemose. *Calyx* 3-5-fid. *Petals* usually 3, thick, concave, imbricate. *Staminal tube* globose, crenate or toothed at the apex; anthers 6-10, included, inserted at the crenatures. *Disk* obsolete. *Ovary* short, usually 3-celled; stigma usually sessile. *Fruit* a loculicidally 3-5 valved capsule. *Seeds* arillate; testa coriaceous, shining; albumen 0; cotyledons connate.

- I. Leaflets opposite. Flowers subsessile, male on branched, female on simple spikes. *Calyx* 5-par e.

Leaflets opposite or subopposite, not lepidote.

Flowers pedicelled. *Calyx* 3-lobed:—

Leaflets obtuse. Male racemes panicled, female simple, short. Anthers 10.

Leaflets abruptly acuminate, racemes as in or male and female flowers on the same n e. n hers usually 8.

Leaflets alternate, lepidote along petiole and nerves. Flowers pedicelled. *Calyx* cup-shaped, obtusely 3-toothed or truncate. Stamens 6.

.. 1. *A. Rohituka*.

.. 2. *A. cucullata*.

.. 3. *A. Wallichii*.

.. 4. *A. chittagonga*.

1. *Amoora Rohituka* W&A. Vern. *Amari*, *Boga-Amari*, *Hakhori-bakhori*, Ass. (Kam); *Titraj*, *Tiktaraj*, Beng.; *Wokek-turang*, Mik.; *Galua*, Naga; *Bagu-rata*, *Thai-thor*, *Thai-dau-ing*, *Mouksa-khislam-phang*, *Kak-sok-thing*, *Thing-ril-char*, Kuki; *Gokul*, Nep.; *Baidraj*, *Beri-Rata*, Sylh.; *Bagu-Rata*, Cach.; *Eng-Gokmi*, *Bolsamphal*, Garo; *Bhoto-mayna*, *Jharua*; *Dieng-Rata*, Khasi; *Dieng-lang-marai*, Khasi (Shella); *Dieng-soh-khyllam-blang*, Khasi (Thlew-slyngam).

A middle-sized evergreen tree with a dense spreading crown; bark greyish-brown outside exfoliating in circular pieces, warty, bright red underneath the corky layer, red inside, gradually lighter inwards, with distant broad streaks of lighter tissue, fibrous, aromatic, generally exuding milky resin from the inner layers; young parts tawny pubescent. *Leaves* crowded at the ends of the branchlets, 12-24 in. long, vivid green; leaflets 9-19, opposite, 3-9 by 1.5-4 in., ovate, oblong or obovate, acuminate, often abruptly; lateral nerves 12-16 on either side of the midrib, slender, slightly arched, subcoriaceous, ultimately glabrous; base very oblique; petiolules 1.5-2 in. long. *Male spikes* panicle about as long as the leaves; *female* simple, much shorter. *Flowers* sessile, rarely very shortly pedicelled, dull-white; bracts minute at the base of the fls.; female about 25 in. long, male much smaller. *Calyx* 5-partite; lobes rounded and with very thin ciliate margins. *Petals* 3, broad elliptic to orbicular, concave. *Anthers* 6, about 1 in. long, lanceolate. *Ovary* 3-celled with two superposed ovules in each cell. *Capsule* 1-1.5 in. long, obovate in outline, yellow when ripe, smooth, 3-valved. *Seeds* usually not more than 2 in each fruit, with a red aril and shining black testa, oblique.

Common though not abundant, throughout the province, excepting hills above 2500 ft.

The timber weighs about 40 lbs per c. ft. and is moderately hard and even and close-grained, but it is brittle and is not much used. An oil is obtained by boiling the macerated seeds in water. It is burnt in lamps and is also used as a liniment in rheumatism and as a dressing for sores.

Fls. 10-11. Fr. 2-5.

2. *Amoora cucullata* Roxb. Vern. *Bor-amari*, Ass. (Sibs.); *Samphal*, Garo.

An evergreen tree up to 80 ft. in height and 7 ft. in girth with grey bark and numerous blind suckers from the roots. *Leaves* 1.5-2.5 ft. long; leaflets opposite or subopposite, 3-13, ovate-oblong, obtuse at both ends, subcoriaceous, glabrous, oblique at the base, the terminal one often falcate; main lateral nerves about 16 on either side of the midrib; petiolules up to about 5 in. long. *Male panicles* drooping, about as long as the leaves; *female racemes* much shorter, few-flowered. *Flowers* yellow, each supported by a pair of caducous bracts. *Calyx* 3-lobed. *Petals* 3. *Staminal tube* turbinate. *Anthers* sessile, included. *Ovary* 3-celled with 2 ovules in each cell. *Capsule* 2.5 in. diam., pyriform-globose, obtusely 3-lobed, 3-valved. *Seeds* 3, with an orange-coloured fleshy aril which covers about three-quarters of each seed.

Very rare. Only once found in the Daiguring Reserve, SIBSAGAR DIVISION.

Wood red, hard and close-grained, weighing about 45 lbs per c. ft. Being liable to split it is seldom used as timber.

Fls. 10-11 (?). Fr. 4-5.

3. *Amoora Wallichii* King. incl. *A. spectabilis* F. B. I., Vern *Amari*, *Bhoto-mayna*, Ass.; *Galing-asing*, Miri; *Dire-asing*, Abor; *Bong-lepbuphang*, Cach.; *Rongi-Rata*, *Phul-Rata*, Cach. and Sylh. *Ringok-me*, *Samphal*, Garo; *Sahateha-kung*, Tipp.; *Pat-amari*; Mech; *Wang-la-bei*, Khasi.

An evergreen tree up to 80 ft. in height and 8 to 9 ft. in girth; often buttressed at the base; bark even but not smooth, grey, about 3 in. thick, light pink inside with streaks of darker pink or white, exuding white gum, turning brown after exposure; young parts brown pubescent. *Leaves* 1.5-2 ft. long, tawny puberulous when young; leaflets 11-13; 4.8 by 1.5-2.5 in., opposite or subopposite, oblong, usually abruptly acuminate, thinly coriaceous, shining above when mature, glaucescent beneath; lateral nerves 10-12 on either side of the midrib, slender but raised and distinct beneath, slightly arched; base rounded; petiolules 2-3 in. long. *Panicles* axillary or supra-axillary, puberulous; *male* much branched and many flowered, 15-18 in. long; *female* 6-8 in. long, less profusely branched. *Flowers* very small. *Calyx* minute, obtusely 3-lobed, tawny-puberulous. *Petals* 3, about 1 in. long, suborbicular, minutely stellate pubescent. *Staminal tube* urceolate, glabrous. *Anthers* usually 3, slightly exserted. *Capsule* 1-1.5 by .8-1 in., pyriform, tomentose.

Fairly common in UPPER ASSAM in evergreen forests, also in the SURMA VALLEY.

Wood red, hard, close-grained, weighing about 49 lbs. per c. ft., med. rays uniform, pores large. It is a very good timber for furniture and doors and windows.

Firs. 8-9. Fr. 1-2.

4. *Amoora chittagonga* Hiern. Vern. *Gangru-changne*. Duff.; *Ponthikechauphang*, Mik.

Apparently a very precocious tree, saplings not more than 10 or 12 ft. in height being found with flower or fruit; young parts also calyx and fruit lepidote with thin silvery scales; bark greyish-brown, smooth on old stems, exfoliating in small scales or peeling off in scrolls; 3 in. thick; inside whitish, exuding milky resin. *Leaves* 6-12 in. long; rachis lepidote; leaflets generally 4-6, alternate or subalternate, 2.5-7 by .8-3 in., elliptic, oblong-elliptic to lanceolate or obovate, bluntly acuminate, slightly or not oblique at base, almost membranous, lepidote along the midrib and nerves esp. when young; lateral nerves 12-16 on either half; petiolules 1-1.5 in. long, stout. *Male panicles* fascicled from the axils of leaves, 4-6 in. long, lax, with slender ramifications and pedicels; *female* shorter, few-flowered with shorter and stouter pedicels. *Calyx* cup-shaped, usually 3-lobed.

Petals 3, sometimes 4. *Staminal tube* urceolate. *Fruit* indehiscent. 2-3 celled, obovoid-globose, about 1 in. long, usually not more than 2 seeded.*

Fairly common in UPPER ASSAM, esp. NORTH LAKHIMPUR and DARRANG.

Wood hard and heavy, used for house posts. The lac insect is sometimes reared on this tree.

Flrs. 3-4. Fr. 11-12.

8. AGLAIA Lour

Trees or shrubs, often lepidote. *Leaves* pinnate or 3 foliolate; leaflets generally opposite, quite entire. *Flowers* polygamous, usually very small, in large panicles. *Calyx* with 5 imbricate lobes. *Petals* 5, concave, imbricate. *Staminal tube* urceolate or globose, 5-toothed at the apex or truncate; anthers usually 5, rarely more, erect, included or half exerted. *Disk* obscure. *Ovary* 1-3-celled with 2 or 1 ovule in each cell. *Fruit* a dry berry, 1-2 celled and 1-2 seeded. *Seed* with a fleshy testa, without albumen.

I. Shoots and inflorescence covered with round scales; adult leaflets glabrous:—

A. Leaflets 3-7:—

Panicles much shorter than the leaves.

Flowers .2 in. across.

.. 1. *A. khasiana*.

Panicles about as long as the leaves.

.. 2. *A. Roxburghiana*.

Flowers about .75 in. across.

B. Leaflets 9-15:—

Panicles about as long as the leaves.

Flowers minute.

.. 3. *A. perviridis*.

II. Shoots and inflorescence covered with scales and stellate pubescence, undersurface of leaves more or less stellate pubescent:—

Panicles about as long as the leaves.

Flowers small.

.. 4. *A. edulis*.

1. *Aglaia khasiana* Hiern.

A small tree; young parts lepidote. *Leaves* 6-12 in. long; leaflets 3-5; 4-8 by 1-2 in., narrow-elliptic, glabrescent; petiolules .3-1 in. long, slender. *Panicles* much shorter than leaves, dense, with short patent branches, ferruginous. *Flowers* large for the genus, generally .2 in. across, subsessile. *Fruit* 1 in. diam.

MIKIR HILLS; also KHASI and NORTH CACHAR HILLS.

2. *Aglaia Roxburghiana* Miq. Syn. *A. odoratissima* Blume.

A small tree (in our area) attaining about 35 ft. with brownish-grey somewhat rough bark; blaze red, fibrous; young parts lepidote. *Leaves* 3-8 in. long; rachis ultimately glabrate; leaflets 3-7, opposite, 2-6 by 1-2.5 in., elliptic-oblong or oblong,

* This description has been given from specimens identified as *Amoora chittagonga* Hiern, at the Sibpur Herbarium. It however agrees in many respects with that of *A. canarana* Benth, which according to Talbot occurs in Assam and Eastern Bengal.

obovate to ovate ; apex subobtusely or bluntly short acuminate, often emarginate, subcoriaceous, glabrous above, sparsely lepidote along midrib and nerves beneath ; base rounded or cuneate ; petiolules 2-5 in. long (those of the terminal leaflets longest). *Panicles* axillary or supra-axillary, about as long as the leaves, pyramidal, lepidote. *Flowers* globular ; pedicels short. *Calyx* lobes rounded, ciliolate, lepidote-pubescent outside. *Petals* yellow, 5 in. long, much exceeding the calyx, glabrous. *Staminal tube* shorter than the petals, obscurely 5-lobed. *Ovary* small, stellately lepidote. *Berry* up to 7 in. long, subglobose, buff tomentose, usually 1-seeded.

A solitary record from Sanitarium hill GARO HILLS about 4000 ft. (Sheet No. 5245).

The pulp of the fruit is edible.

Flrs. rainy season. Fr. cold season.

3. *Aglaia perviridis* Hiern. Vern. *Thaidubriki-buphang*, Cach.

A small tree ; young parts lepidote. *Bark* greyish-brown, rather rough outside and fibrous, reddish-brown with beautiful streaks of deeper red and with an aromatic smell inside. *Rachis* 6-11 in. long, more or less lepidote, glabrate with age. *Leaflets* 9-13, opposite or sub-opposite, 3-6 by 7-2 in., lanceolate, narrow lanceolate or ovate-oblong, acuminate, glabrate with age, coriaceous ; lateral nerves 14-18 on either half ; base narrowed or rounded ; petiolules 3-5 in., that of the terminal leaflet longest, channelled. *Panicles* axillary about as long as the leaves, at first lepidote, glabrate with age ; bracts and bracteoles very small, lanceolate ; buds puberulous. *Flowers* white, minute. *Fruit* obliquely globose ; about 1.2 in. long, closely invested with brown scales.

CACHAR HILLS, KHASI HILLS ascending to 2000 ft. (Hooker).

Wood reddish brown, med. rays fine, pores joined by fine wavy concentric lines of soft tissue.

Flrs. 5-6. Fr. 12 ?

4. *Aglaia edulis* A. Gray. Vern. *Khrang*, Mik. ; *Thing-ril-char*, Kuki ; *Dieng-soh-longar*, Khasi.

A fairly large tree up to 75 ft. in height and 6 ft. in girth with fluted stem ; young parts covered with stellate hairs and scales mixed ; bark grey, plain outside, exfoliating in round or irregular-shaped flakes, red underneath the epidermis, 2 in. thick, reddish-brown and softly fibrous inside with very faint white streaks exuding a thin milky sap. *Leaves* 1-2 ft. long ; leaflets 9-13, 3-9 by 1-3 in., opposite or subopposite, broad-elliptic to narrow-oblong, or lanceolate, obtusely acuminate, chartaceous, covered with stellate hairs, mixed with ferruginous scales, specially on the nerves beneath or glabrescent ; lateral nerves about 16 on either side of the midrib ; base of lateral leaflets slightly oblique ; petiolules 2-3 in. long, stout. *Panicles* 5-8 in. long, pyramidal. *Flowers* small, pedicelled. *Fruit* about 1 in. across, globose, covered with thin buff scales, up to 3-celled, usually 2-seeded.

Soudangpathar in the Doyang Reserve, SIBSAGAR. Also south-eastern slopes of the MIKIR HILLS, and the NORTH CACHAR HILLS; up to 1900 ft. in KHASI HILLS.

Wood dark-brown with wavy bands of softer tissue, very hard, medullary rays very fine, close and parallel, pores scanty. Suitable for posts, tent-pegs and agricultural implements. The fleshy integument of the seeds is eaten.

Flrs. ? Fr. 2-3.

A. Wallichii Hiern.—Branchlets terete. Leaf rachis sharply margined. Leaflets 5-9, very thinly coriaceous, 2-2.5 by 3-1 in., elliptic or ovate lanceolate, acuminate; lateral nerves about 10 on either half, indistinct near the apex; petiolule 1.5 in., channelled. Panicle with angled rachis and branches, mostly puberulous, about equalling leaves. Flowers minute. Calyx lepidote, shortly ciliate. Corolla glabrous. Berry not seen.

SYLHET (Wallich) Record based on a solitary specimen No. 8036 Wallich's catalogue in Herb. Calcutta.

9. WALSURA Roxb.

Trees. Leaves 1-foliolate or pinnately 3-5 foliolate; leaflets opposite, entire, pale beneath. Flowers 2-sexual, small, in axillary and terminal panicles. Calyx short; lobes 5, imbricate. Petals 5, ovate-oblong, spreading, slightly imbricate or subvalvate. Stamens usually 10; filaments free and thin, linear or subulate, or connate in a tube, usually notched at the apex, each bearing an anther at the notch. Disk annular. Ovary small, 2-3 celled, imbedded in the disk; style short; ovules 2 in each cell. Fruit indehiscent, 1-2 seeded; seeds enclosed in a fleshy aril, exalbuminous.

Leaflets usually 3. Stamens connate the whole way.
Leaflets usually 5. Stamens free or only slightly
connate at base.

.. 1. *W. tubulata*,

.. 2. *W. robusta*.

1. *Walsura tubulata* Hiern.

A small tree up to about 40 ft. in height and 2.5 ft. in girth; branchlets covered with raised lenticel specks; young shoots and inflorescence brown pubescent; bark light-grey, thin. Leaves 3-foliolate; common petiole flattened above; leaflets 3-9 by 1-3 in., lanceolate to ovate or elliptic-oblong, acuminate, subcoriaceous, glabrous and shining above, glaucous beneath; lateral nerves about 10 on either side of the midrib, arched; tertiaries very close and finely reticulate; petiolules somewhat flattened, swollen at both extremities, of lateral leaflets 2-8 in. long, of terminal leaflet about double that length. Panicles racemose, shorter than the leaves. Flowers about 2.5 in. long, rather large for the genus, yellowish; bracts small, boat-shaped. Calyx 5-partite, pubescent. Staminal tube 5-lobed at the apex, glabrous outside, thinly pubescent inside; lobes notched at the extremity. Fruit not seen.

Dry forests in the neighbourhood of Lumding, NOWGONG Division, not very common. Also KHASI HILLS.

Wood hard, weighing about 60 lbs per c. ft., but liable to split irregularly.

Flrs. cold season.

2. *Walsura robusta* Roxb. Vern. *Lali*, Ass.; *Theng-rali*, Mik.; *Mogchouphong*, Cach.; *Makhang-thing*, Kuki; *Bol-khrenthi*, *Bol-dublok*, *Khrauchi*, Garo; *Diengsoh-phlang*, Khasi.

A small or middle-sized tree up to 70 ft., in height and 5-6 ft. in girth; bark dark-brown covered with fat corky warts, greenish-red underneath the corky layer which is easily separated and the inner surface of which is red and of a chequered pattern; blaze about .5 in. thick, pinkish red, fibrous, with fine wavy streaks of whitish tissue; branchlets covered with lenticels; young shoots pubescent. *Leaves* 6-10 in. long; rachis slightly flattened above; leaflets generally 5, sometimes 3; 2-6 by 1-2.5 in., elliptic or oblong lanceolate, bluntly acuminate, chartaceous, glabrous, shining above, pale beneath, reddish brown, when young, turning yellow before shedding; lateral nerves 5-7 on either half, arched, nervules closely reticulate but indistinct; base acute; petiolules of lateral leaflets .2-5 in. long, of terminal leaflet 1-1.5 in. long. *Panicles* mostly terminal, 4-8 in. long, rachis somewhat flattened; branches pubescent; bracts caducous, lanceolate, acute. *Flowers* white, about .2 in. across; pedicels short. *Calyx* about .1 in. across, minutely 5-toothed, ferruginous-pubescent. *Petals* about .1 in. long, ovate, acute, spreading, thinly pubescent outside. *Filaments* usually 10, white, subulate, tapering to a fine point, each point bearing a globose yellow anther, subconnivent over the stigma, free or slightly connate at the base. *Disk* fleshy, slightly lobed. *Ovary* 2-celled; style short; stigma capitate. *Fruit* .5-7 in. long, subglobose, pubescent outside.

Foot of the MIKIR HILLS towards Lumding; also NORTH CACHAR, GARO & foot of KHASI HILLS.

Wood brown or light red, very hard, weighing about 65 lbs per c. ft., pores joined by fine wavy concentric lines, med. rays very fine, close, liable to split, but seems suitable for agricultural implements.

Flrs. 3-5. Fr. 12-3.

10. CHICKRASSIA* Andr. Juss.

Chickrassia tabularis Andr. Juss. Vern. *Boga-poma*, Ass. (Sibs.); *Chokori-poma*, Ass. (Nowg.); *Lahripoma* (Goalpara); *Silling* or *Silengasing*, Miri; *Harbi-beh*, *Haribe*, *Chany-hedim*, Mik., *Bon-ridim-phang*, Kach.; *Song-mel*, Kuki; *Haithna-poma*, Sylh.; *Thing-poi*, Tipp.; *Bol-dorek*, *Chuma*, Garo; *Rata-tuni* Nep.

A handsome lofty tree—(a tree 160 ft. high and 28 ft. 5 in., in girth has been measured near Pillung, N. E. F. District, in December 1913); branchlets lenticellate. *Bark* dark-grey outside, deeply cracked, inside fibrous, pink or light red, .5-1 in. thick. *Leaves* 12-20 in. long, often softly pubescent when young; rachis terete; leaflets 10-24, usually alternate, 2-6 by 2-2.3 in., ovate or elliptic-lanceolate, acuminate, entire, thinly

* Original spelling *Chukrasia*.

chartaceous, glabrescent; lateral nerves about 10 on either side of the midrib, nervules closely reticulate; base oblique and unequal-sided; petiolules .15-.2 in. long. *Panicles* terminal, shorter than the leaves. *Flowers* white, .5-.6 in. long. *Calyx* small, dentate. *Petals* white, oblong, erect, imbricate in bud. *Staminal tube* cylindrical, dark purple, 10-toothed at the apex and bearing anthers on the edge. *Ovary* hairy, usually 3, sometimes 4 celled. *Fruit* a septicidally 3 valved capsule, .15-.2 in. long, ellipsoidal, speckled with lenticels outside, valves entirely separating from the axis and consisting of two plates, inner woody, septate, striate. *Seeds* about .2 in. long, elliptic, flat with a dark-brown wing, .3-.6 in. long, very closely and transversely packed, the seed and tail ends in each series alternating, exalbuminous.

Common in the N. E. FRONTIER DISTRICT, but occurs in varied proportions in evergreen forests in all the other Districts of the province.

Wood hard, reddish-brown with a satiny lustre, weighing about 50 lbs per c. ft., very suitable for planking and furniture, but difficult to saw and plane owing to uneven course of the fibres. The bark possesses astringent properties.

Fls. 5-7. Fr. 12-5.

11. CEDRELA Linn.

Tall deciduous trees with red aromatic wood. *Leaves* pinnate. *Leaflets* opposite, subopposite or alternate; stipules 0. *Flowers* white or pale yellow in terminal or subterminal panicles of cymes, often dimorphic; pedicels often jointed. *Calyx* small, 5-cleft. *Petals* 5, imbricate, suberect, usually keeled inside at the base. *Disk* thick, 4-6 lobed. *Stamens* 4-6, rarely 10, free, inserted on the top of the disk, sometimes reduced to staminodes in the female flowers; anthers versatile. *Ovary* 5-celled; style simple; ovules pendulous, 8-12 in each cell in two series. *Fruit* a capsule, septicfragally 5-valved. *Seeds* compressed, albuminous, winged at both ends (in the species described below).

Leaves mostly paripinnate, with opposite or subopposite leaflets:—

Capsule smooth or minutely lenticellate, generally not exceeding 1 in. in length; common petiole and petiolules usually glabrous.

Capsule nearly 2 in. long, conspicuously warty; common petiole and petiolules pubescent.

.. 1. *C. Toona*.

.. 2. *C. febrifuga*.

(Var. *assamensis*).

Leaves usually, imparipinnate; leaflets mostly alternate; common petiole and petiolules pubescent; capsule .6-.8 in. long, verrucose.

.. 3. *C. microcarpa*.

1. *Cedrela Toona* Roxb. Vern. *Poma*, Ass. Sylh. and Jharua; Tun, Beng.; *Banji-asing*, *Poma-asing*, Miri; *Poma*, *Khat-mai*, Cach.; *Hudu*, *Antei*, Kuki; *Tairel*, *Taireny*, Manip.; *Jia-poma*, Ass. and Mech; *Jati-poma*, Ass.; *Suraj-bed*, *Surja-poma*, Sylh.; *Intei*, Tipp.; *Harbi-beh-arong*, *poma-arong*

Mikir ; *Dieng-biti*, Khasi ; *Dieng-sali*, (Bhoi country), *Dieng-tylenny*, Khasi (Shella) ; *Dieng-sau*, Khasi (Isamati) ; *Kuma*, Synt. ; *Bot-bret*, Garo.

A large handsome tree. *Bark* grey exfoliating with distant flakes of irregular shape, 6-8 in. thick, fibrous, pinkish-red inside, mottled with fine radial streaks of white, turning brown on exposure. *Leaves* generally paripinnate, 1-2 ft. long, somewhat crowded at the ends of branchlets ; common petiole glabrous, terete : leaflets 8-25, opposite or alternate, 2-5 by 7-2 in., lanceolate or ovate-lanceolate, caudate-acuminate, entire but with wavy margins, chartaceous, glabrous and shining above, often minutely pubescent and with a tuft of hairs at the axils of the secondary nerves beneath ; lateral nerves 10-15 on either side of the midrib, slender, arched ; base acute, oblique ; petiolule 2-5 in. long. *Panicles* shorter than the leaves, pyramidal with slender ramifications. *Flowers* white, faintly fragrant. *Calyx* small ; lobes broad ovate, subacute or obtuse, grey-ciliate, puberulous outside. *Petals* 15-2 in. long, oblong or obovate oblong, obtuse with ciliate margins. *Disk* with five hairy orange-coloured lobes. *Stamens* 5 ; filaments glabrous, connective apiculate. *Stigma* capitate, depressed at the apex. *Ovary* hairy. *Capsule* 7-1 in. by 2-3 in. diam., oblanceolate, dark-brown, usually smooth outside, sometimes lenticellate. *Seeds* tan-brown, very light, winged at both ends, 5-6 in. long including the wings.

Wood brick-red, soft, shining, open grained, fragrant, weighing about 35 lbs per c. ft. It seasons well and takes a good polish. It is much used for furniture and doors and windows. 8000-12000 seeds weigh 1 oz.

Flrs. 3-4. Fr. 5-7.

The above description applies to var. *typica*, which is fairly common throughout Assam, but less so than Var. *pilistaminea* C. D. C. Vern. *Jatipoma*, Ass., which is a smaller tree with smaller and more membranous longer-petioluled fewer leaflets, pilose filaments and shorter but stouter capsules often with minute lenticels. The bark exfoliates in regular papery flakes. The wood is less porous than of the type and weighs about 50 lbs. per c. ft.

Flrs. 1-2. Fr. 3-4.

Var. *multijuga* Kurz. *Khatmaiphang*, Cach.—*Branchlets*, rachis of leaves, petiolules and inflorescence permanently pubescent or puberulous, petiolules up to 6 in. long. *Filaments* glabrous, other characters as in Var. *typica*.

N. CACHAR HILLS.

Flrs. 5.

2. *Cedrela febrifuga* C. DC. Var. *assamensis* C. B. Cl. Vern. *Jati-poma*, *Phata-poma*, Ass. ; *Kimbou-phang*, Kach. ; *Inse-ebang*, Naga ; *Bot-bret*, Garo.

A middle sized tree up to 50 ft. in height ; branchlets rather thick. *Bark* rough with vertical cracks, peeling off in oval flakes, 3 in. thick, red inside. *Leaves* paripinnate, 1.5-2.5 ft. long ; common petiole terete, pubescent at least when young ; leaflets up to 20 (?) mostly subopposite, 3-6 by 1-2.5 in., ovate-oblong, ovate or lanceolate, shortly caudate-acuminate, more or less rounded or subacute at the base, entire, rather membranous, concolorous on both surfaces, minutely puberulous along the

midrib and nerves or glabrate above, more or less pubescent along nerves beneath; lateral nerves 16-20 on either half, more transverse and less arched than in *C. Toona*; petiolule .15-.2 in. long, stout, puberulous. *Panicles* 16-20 in. long, narrower than in the preceding species, puberulous; pedicels velvety. *Flowers* small; buds almost globose. *Calyx* 5-toothed, hairy outside, margins ciliate; petals obtuse at both ends, hairy specially along the middle on both surfaces, ciliate on the margins. *Filaments* and *Ovary* hairy. *Capsule* 1.5-2 in. long and up to .6 in. across, ovate-oblong, black, with large oblong brown warts outside. *Seeds* numerous, compressed, less than .25 in. long; upper wing .3 in., lower .7 in., long, tan-brown, membranous.

Occurs in evergreen forests of LAKHIMPUR and SIBSAGAR, e.g. Jeypur, Tippam, Deroi Reserve, Dikhari, etc.

Fls. 7-9. Fr. 12-1.

Var. *Peali*, *C. DC.*—*Calyx* glabrous, rugulose outside; petals glabrous outside, sparingly pilose inside. *Capsule* unknown.

SIBSAGAR (G. E. Peal).

3. *Cedrela microcarpa* C. DC. Vern *Jati-poma* Ass.; *Khatmai-phang*, Cach.

A fairly large evergreen tree. *Bark* dark-brown, exfoliating in thin flakes, fibrous and uniformly red inside, turning yellowish-brown on exposure, aromatic, .5-.7 in. thick. *Leaves* 12-15 in. long; common petiole slender, terete; leaflets mostly alternate and then 9-15, (8-16 when opposite), 3-5 by 1-2 in. long, falcately lanceolate or ovate, caudate- acuminate, entire, membranous, glabrous and shining above; lateral nerves 8-12 on either side of the midrib, usually with a dense tuft of bristle-like brown hairs at the axils beneath; base oblique; petiolules .1-.4 in. long, slender, channelled. *Panicles* shorter than the leaves, ramifications somewhat zigzag and irregularly compressed, hairy. *Flowers* small. *Calyx* nearly glabrescent, ciliate, broad ovate or suborbicular, subacute or obtuse. *Petals* about .1 in. long, oblong, slightly hooded at the apex, glabrous, minutely ciliate on the margins; filaments densely pilose, connective apiculate. *Disk and ovary* densely hairy; style glabrous. *Capsules* .6-.8 in. long, dark-chocolate or black and verrucose outside. *Seeds* very light, .5-.6 in. long, winged at both extremities.

Rather rare, usually in hilly country ascending to 4000 ft.

The wood is finer-grained and less porous than, and used for the same purposes as, that of *C. Toona*. Weight about 36 lbs. per c. ft.

Fls. during the rains (?). Fr. 11-1.

Cedrela Mannii*, C. DC. *Rachis* minutely puberulous. *Leaflets* 6 pairs (?) opposite or subopposite, about 4.5 by 1.5 in., oblong or ovate-oblong, somewhat obtusely acuminate, entire, minutely puberulous on the midrib above, glabrous beneath; lateral nerves about 20 on either side; base oblique, usually rounded; petiolules very short. *Panicles* puberulous; pedicels short; calyx bluntly 5-toothed, ciliate on the edges. *Petals* about .15 in. long, oblong, obtuse, margins ciliate; filaments densely pilose, connective of anthers not apiculate. *Disk and ovary* hirsute; style glabrous.

KHASI HILLS (Mann).

* Records of Bot. Survey of India Vol. III. P. 374-375.

FAM. 35. CHAILLETIACEÆ.

DICHAPETALACEÆ Engler.

Trees or shrubs. *Leaves* alternate, entire, simple; stipules 2, deciduous. *Flowers* small, 1-sexual or polygamous; *males* in axillary and terminal paniced cymes; *females* generally solitary on the axils of leaves with the peduncle often partly adnate to the petiole. *Sepals* 5, unequal, imbricate. *Petals* 5, free, equal or unequal, notched or 2-fid. *Stamens* 5, free or adnate to the petals; anthers oblong, introrse; connective often thickened at the back. *Disk* of 5 glands or scales inserted opposite the petals. *Ovary* free, 2-3 celled; ovules in collateral pairs, anatropous, pendulous from the apex of each cell. *Fruit* drupaceous, densely velvety-pubescent, compressed, with one pendulous seed in each cell. *Seed* with a large hilum and membranous testa; albumen 0; radicle superior; cotyledons thick.

1. DICHAPETALUM Dup. Thouars.

CHIALLETIA DC.

Dichapetalum gelonioides Engl. Syn. *Chailletia gelonioides* Bedd. *C. sumatrana* Miq. Vern. *Rokpoletak*, Miri & Abor; *Dingrali-arong*, Mik.

A small evergreen tree up to 40 ft. in height and 2.5 ft. in girth with spreading branches; young parts and inflorescence grey pubescent. *Bark* thin, greyish-brown, somewhat rough with lenticels, light-brown inside, turning yellow on exposure. *Leaves* bifarious, 2.5-6 by 8-2.5 in., elliptic to ovate-lanceolate, usually abruptly caudate-acuminate, chartaceous, narrowed to a very short petiole; lateral nerves generally 4-5 on either half, much arched, the lowest basal or sub-basal; tertiary nerves closely reticulate, more or less transverse; stipules 2-3 in. long, subulate, densely grey-hairy. *Flowers* polygamo-monoecious, in dense cymose clusters, generally paniced at the ends of branches of leaf axils; panicles up to 3 in. long; bracts and bracteoles small. *Male flrs.*—*Sepals* up to .1 in. long, unequal, united at the base, elliptic, subacute or obtuse, densely pubescent. *Petals* 5, about slightly longer than the sepals, linear oblong, deeply notched at the apex, adnate at the base to the sepals. *Stamens* inserted at the base of the calyx, nearly as long as the petals, connective broad. *Disk* of 5 quadrate scales. *Female flrs.*—As in the males but with sterile anthers; ovary broad, wooly; styles 2, recurved. *Drupe*

when perfect about .5 in. long, .7-.8 in., broad and .3-.4 in. thick, 2-lobed, transversely oblong or obovate with two stones but sometimes only one carpel, perfect and thin, oblong and oblique with 1-stone, densely buff-felted outside; pericarp splits along the broader periphery exposing the orange-coloured thin mesocarp; endocarp rough, crustaceous; testa dark-red; cotyledons very fleshy, oily.

Evergreen forests of the N. E. F. DISTRICT, LAKHIMPUR and SIBSAGAR, not very common—Nizamghat, Borjan, Gaurisagar, Jamuguri; SYLHET, foot of the KHASI HILLS.

Wood light yellowish-brown, tough and hard, capable of being used for agricultural implements, tent-pegs, etc.

Flrs. 4-5. Fr. 11-1.

FAM. 36. OLACACEÆ.

Trees or shrubs, sometimes climbing, rarely undershrubs. *Leaves* usually alternate, simple, penni- or palmi-nerved; stipules 0. *Flowers* small, regular, cymose, bracteate, generally 2-sexual. *Calyx* usually small, of 4-5 teeth, sometimes reduced to a rim, rarely 0, often accrescent, valvate or imbricate. *Petals* 3-6, free or connate, valvate, rarely imbricate. *Stamens* 3-15; filaments free or adnate to the petals or fertile or some reduced to staminodes; anthers erect, 2-celled, introrse. *Ovary* free or adnate to the calyx, 1-celled or imperfectly 2-5 celled; style simple or 0; ovules 1-5, generally pendulous from the apex of a free central placenta. *Fruit* drupaceous, indehiscent, 1-celled, 1-seeded. *Seed* pendulous, albumen fleshy.

- I. Calyx and corolla both present, the former accrescent:—
 - A. Bracts not connate, minute and caducous or 0. *Staminodes* 5:—
 - Generally erect shrubs, without tendrils. .. 1. *Olax*.
 - Petiole less than .5 in. long.
 - Climbing shrubs with tendrils. Petiole 1-2 in. long .. 2. *Erythralium*.
 - B. Bracts connate forming a persistent epicalyx. *Staminodes* 0. Trees .. 3. *Schœpfia*.
- II. Perianth of one whorl of inflorescence supported by large broad (hop-like) bracts. *Staminodes* 0. Small trees. .. 4. *Lepionurus*.

1. OLAX Linn.

Trees or shrubs, sometimes climbing and spinescent, rarely undershrubs. *Leaves* alternate, often distichous, entire. *Flowers* in axillary short, simple or branched racemes. *Calyx* truncate or nearly so, enlarging in fruit. *Petals* 3-6, more or less coherent or free, valvate. *Fertile* stamens 3-5, usually 3, attached to the

base of the petals; staminodes usually 5-6. *Ovary* free, usually seated in a cup-shaped disk, 1-celled above and more or less 3-celled below; ovules 3, pendulous from the apex of a free central placenta; style simple; stigma 3-lobed. *Drupe* surrounded by the accrescent calyx; stone crustaceous; seed albuminous, embryo minute.

Shrub or a small tree; leaves green beneath, acuminate at apex; flowers in very short racemes. Undershrub with annual shoots, leaves glaucous beneath, obtuse at apex; flowers usually solitary on slender peduncles.

.. 1. *O. acuminata*.

.. 2. *O. nana*.

1. *Olax acuminata** Wall. Vern. *Han-misang*, *Han-boka*, *Han-maljiangarong*, *Han-kanoj*, Mik., *Misen-buphang*, *Yao-laisaphang*, Cach., *Shamakubu*, *Mithi-phang-thing*, Kuki; *Bol-narang*, *Moën*, Garo; *Dieng-tyrut*, *Dieng-tulut*, Khasi.

A large shrub or small tree up to 16 ft. in height and a foot in girth; branches dark-green, smooth and with shallow but long longitudinal fissures; bark thin, greenish-white inside; branchlets angular. *Leaves* 2-4 by 6-1.5 in., elliptic or oblong lanceolate, acute or acuminate, entire, membranous, glabrous, shining above, pale beneath, giving a fetid smell when bruised; main lateral nerves 7-10 on either side of the midrib, very slender, more or less anastomosing at the outer extremities to form an uneven intramarginal nerve; petiole about 1 in. long, margined. *Inflorescence* axillary, scarcely exceeding 3 in., 3-7 flowered, solitary or fascicled; bracteoles ovate, minute, caducous; buds elliptic-ovoid. *Flowers* white, 1.5-2 in. long; pedicels ascending, short. *Calyx* very small, salver-shaped, almost imperfectly 3-toothed, accrescent in fruit. *Petals* 3, oblong, valvate, each bearing at the base one short fertile stamen along the middle and two long staminodes, one on either side of the stamen; anthers 2-celled, adnate, oblong. *Style* simple. *Drupe* .65 in. long by .5 in. diam., ellipsoid or ovoid-oblong, seated inside the cup-shaped accrescent calyx, orange-red when fully ripe; stone 1-celled, 1-seeded.

Round the base of the Mikir Hills from the Doyang Reserve, SIBSAGAR on the east to the Kholahat Reserve, NOWGONG, on the west. Distribution the N. C. HILLS, SYLHET, CACHAR, Bijnî Reserve in GOALPARA, the GARO HILLS, KHASI & JAINTHIA HILLS up to about 2500 ft.

Wood cream coloured, tough and close-grained. The Mikirs eat the leaves cooked, especially with fish and meat.

Flrs. 4-5. Fr. 5-7.

2. *Olax nana* Wall.

A switchy undershrub about 2 ft., high, stems striate. *Leaves* subsessile, 1-2.7 by .3-6 in., narrowly oblong-lanceolate or ovate-

* M. T. Masters in the Fl. Br. Ind. suspects *Olax acuminata* Wall. to be, and Mr. Gamble has described it as, a climbing shrub. But the plant as described above has no climbing tendency. It can hardly be *O. zeylanica* Linn., which has 5 petalous flowers. If it is not *O. acuminata* Wall., can it be a new species?

lanceolate, obtuse at the apex, entire, margins often recurved. glabrous above, glaucous beneath: lateral nerves indistinct. *Flowers* white, about .25 in. long, solitary, on slender axillary peduncles up to .5 in. long; buds clavate, oblong. *Petals* 3, oblong, obtuse at the apex, cohering towards the base. *Fertile stamens* 3, opposite the centre of the petals; staminodes 6, one on each edge of the petals, bifid. *Drupe* subglobose, .25 in. long, nearly covered by the accrescent scarlet calyx.

Foot of KHASI HILLS (record based on incomplete material), ASSAM—Fisher (!) LOWER ASSAM—Gustav Mann (!), grass land near Raimon GOALPARA DISTRICT—C. Purkayastha. Among grass in drier districts.

The fruits are edible but they are insipid.

Frs. 3-5. Shoots are annually produced from a woody rootstock.

2. ERYTHRALUM Bl.

Climbing shrubs with axillary tendrils. *Leaves* alternate, simple, palminerved at the base. *Inflorescence* axillary, dichotomous, ebracteate. *Flowers* very small. *Calyx* 4-5 lobed, adherent to the ovary, accrescent. *Petals* 5, valvate, combined into a campanulate corolla. *Stamens* 5, opposite the petals and inserted on them; filaments very short; anthers adnate, incurved; connective thick. *Staminodes* 5, inserted with the stamens on the petals and alternating with them. *Ovary* conical, half immersed in the disk, 1-celled; style simple, short; ovules 1-3, naked. *Fruit* indehiscent, crowned by the tips of the enlarged calyx-lobes. Seed 1, pendulous; embryo minute; albumen fleshy.

Leaves subcoriaceous. Ripe fruit whitish, smooth. ... 1. *E. Vagum*.

Leaves membranous. Ripe fruit yellowish, rough. ... 2. *E. scandens*.

1. *Erythralum vagum* Mast. Vern. *Lojangthu*, Mik.

A rambling climber with whitish stem. *Leaves* 4-6 by 1.7-4 in., ovate oblong, acute or acuminate or obtuse, subcoriaceous, shining above, glaucous beneath, subpeltate, usually 5-nerved at the base with 3 or 4 lateral nerves on either side of the median nerve; base truncate or subacute; petiole 1-2 in. long, terete. *Inflorescence* 8-10 in. long, laxly branched; peduncles 5-7 in. long, slender, terete. *Calyx* obscurely 5-lobed. *Corolla-lobes* oblong-ovate, reflexed. *Filaments* very slender. *Ovary* 1-celled with a large 5-lobed disk on the top; ovules 3, pendulous. *Fruit* .6-1 by 4-6 in., ellipsoid or ovoid-oblong, whitish, narrowed at the base to a stipe, spongy inside. Seed solitary, large, naked.

Fairly common along the foot of the NAGA HILLS and MIKIR HILLS, c. g. Merapani, Kalioni, Garampani, etc.

Frs. Rainy season, Fr. cold weather.

2. *Erythralum scandens* Bl.

Closely resembling the foregoing species and hardly a distinct species. The *leaves* are ovate to ovate lanceolate, thinner, pale beneath, generally 3-nerved at the base, often subcordate; *inflorescence* shorter, fruit yellowish when ripe, not so smooth outside as of the other species.

Western half of the SIBSAGAR DISTRICT.

Distribution KHASI HILLS along its southern slopes, ascending to 2500 ft., Hat Mawdan, Syndai, etc.

Fls. Rainy season. Fr. cold weather.

3. SCHOEPPFIA Schreb.

Schœpfia fragrans Wall. Vern. *Soh-kymphurkhlaw*, *Dieng-khao-khorai*, Khasi; *Dieng-shleng-khlaw*, Khasi (Mairang); *Dieng-sarumi*, Synt.; *Dieng-sa-niriang-blai*, Synt. (Raliang).

A small evergreen tree up to about 40 ft. in height and 1 ft in girth; branchlets angular. *Bark* pale-brown or grey, corky, closely but not deeply reticulate, with fine horizontal fissures, '2-6 in. apart; inside pale-brown, turning deeper brown on exposure. *Leaves* 2-3.5 by .5-1 in., lanceolate, acuminate, with entire and slightly revolute margins, thinly coriaceous, glabrous; lateral nerves indistinct, about 5-7 on either side of the midrib; tertiaries laxly reticulate; petiole .2-3 in. long, margined. *Racemes* axillary, up to about an inch long, usually 3-6, sometimes 9 flowered; buds ellipsoid-oblong; pedicels slender, '2-3 in. long. *Flowers* yellowish-white, exquisitely fragrant, '4-5 in. long, each supported by an epicalyx of 3 ciliate bracts, connate into a cup. *Calyx* obconic in flower, with a truncate or obsoletely 4-5 lobed margin, accrescent in fruit and remaining attached to it. *Petals* usually 5, combined up to about three-fourths of their length, free portion valvate in bud; tips slightly hooded and with a tuft of hairs inside about the middle and behind the anthers. *Stamens* included; filaments adnate to the petals nearly their whole length. *Ovary* half superior, 1-celled above, 3-celled beneath, surmounted by a fleshy conical lobed disk; style glabrous; stigma with 3 globular lobes. *Fruit* a 1-celled 1-seeded drupe, '5-6 in. long, ellipsoid, supported by the epicalyx and covered up to the top with the accrescent calyx, white and succulent when ripe, stone thin-walled, striated; seed white, conforming with the stone; embryo minute at the apex of the fleshy albumen.

Jaipur, LAKHIMPUR, but likely to occur in similar localities in UPPER ASSAM; KHASI HILLS, 5-6000 ft.

Wood pale-white with close soft wavy bands of softer tissue, weighing 33 lbs. per c. ft., not used for timber.

Fls. 9-1. Fr. 2-4.

Schœpfia acuminata Wall. A small tree. *Leaves* 1.5-3.5 by '8-1.7 in., elliptic acuminate; lateral nerves very slender, 3-5 on either half, tertiaries not visible; petiole flattened, '15-2 in. long. *Raceme* about 1 in.; pedicels stiff, '2-3 in. *Flowers* '6 in. long. *Corolla* tubular campanulate, lobes ovate. *Stamens* and *ovary* as in *S. fragrans*.

Very doubtfully different from *S. fragrans*. The difference is supposed to consist in its broader leaves, shorter pedicels and larger flowers. The only difference I am able to make out is a slight one. in the venation of leaves, which would not entitle it to specific rank.

Only one sheet from Mismi country collected by Griffith in Sibpur herbarium, KHASI HILLS about 6000 ft. Laitkor (My sheet No. 7922)?

Flrs. 7-9. Fr. 10-12.

4. LEPIONURUS Bl.

Lepionurus sylvestris Bl. Syn. *L. oblongifolius* Mast. Vern. *Impai-kelok*, Mik.

A large shrub or small tree with grey bark and long switchy green branches, somewhat lanky in habit. *Leaves* alternate, 4-7 by 1·2-3 in., oblong-lanceolate to elliptic or obovate, acute or acuminate, entire, membranous, glabrous, covered on both surfaces with numerous raised pustules; lateral nerves 6-9 on either side of the midrib, slender, arched; base acute; petiole 1·2 in. long, margined. *Flowers* greenish, faintly scented, 2-sexual, about 0·7 in. diam., tetramerous, in umbel-like groups of 3-9 on small bracteate protuberances on the rachis of fascicled, axillary or slightly supra-axillary slender racemes, 1-2·5 in. long, ovate, membranous, ciliate. *Calyx* 0. *Perianth* urceolate, 4-lobed; lobes ovate, subvalvate, velvety outside. *Stamens* 4, opposite the perianth lobes; anthers subsessile. *Staminodes* 0. *Disk* fleshy, lining the base of the perianth-tube. *Ovary* free; 1-celled; stigma sessile. *Fruit* a 1-seeded glabrous drupe, 5 in. long by 2·5 in. across. *Seed* pendulous; cotyledons ternate.

In damper parts of evergreen forests in the N. E. F. DISTRICT, LAKHIMPUR, SIBSAGAR and DARRANG, N. C. and KHASI HILLS.

Flrs. generally 3-4, occasionally in October. Fr. rainy season.

Anacolosa ilicoides Mast.—A small tree, branchlet pale white. *Leaves* 1·3-6 by 6-2 in., elliptic or oblong elliptic, acute at both ends, lateral nerves 6-8 on either side, slender; petioles 2-4 in. long. *Flowers* small, about 0·8 in. diameter, 2-6 (?) together in lax umbellate peduncled cymes; peduncles axillary, half the length of petioles. *Calyx* cup-shaped, glabrous, 5-6 toothed. *Petals* 5-6, much exceeding the calyx, oblong, concave at the base, inserted with the stamens on the disk. *Stamens* slightly adnate to the petals, opposite and concealed by them, filaments broad, glabrous. *Ovary* imperfectly 3-celled, depressed, conic; ovules 3.

Only one sheet from KHASI HILLS in Sibpur herbarium, collected by Wallich. Purkayastha has made further collection in 1935 from Umsaw K. & J. Hills.

Fam. 37 ICACINACEÆ.

Trees or shrubs, the latter sometimes climbing. *Leaves* generally alternate, simple; stipules 0. *Flowers* small, 2-sexual, polygamous or dioecious, in corymbose cymes, racemes or heads. *Calyx* small and 5- (rarely 4- or 6) lobed or partite or wanting. *Petals* or perianth segments 5, rarely 4 or 6, free or connate. *Stamens* isomerous and generally alternate with the petals or perianth-segments, in female flowers reduced to staminodes. *Ovary* generally 1-celled, occasionally 2-celled, with 1-2 ovules, pendulous from the apex of each cell. *Fruit* a 1-seeded drupe.

- I. Trees or shrubs generally erect :—
 A. Flowers 2-sexual, petals free :—
 Petals glabrous within, ovary oblique. .. 1. Apodytes.
 Petals villous within, ovary straight. .. 2. Mappia.
 B. Flowers polygamous diceious, petals connate. .. 3. Gomphandra.
- II. Climbers. Flrs. diceious :—
 A. Leaves alternate. Stamens alternate with the petals :—
 Flowers in heads, calyx 0. .. 4. Miquelia.
 Flowers in supra-axillary racemes, calyx present. .. 5. Nastiatum.
 B. Leaves opposite or nearly so, stamens opposite the petals. Flrs. in cymes; calyx persistent. .. 6. Iodes.

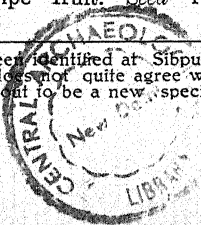
1. APODYTES Meyer.

Apodytes Benthamina Wight. Vern. *Dieng-sormi*, Synt.; *Dieng-lapitri-jem*, Khasi.

A handsome tree with a clean cylindrical trunk, up to 80 ft. in height and 5 ft. in girth; young shoots pubescent. *Bark* outside with warts, 5-7 in. thick, light brown, mattedly fibrous and granular inside with a few faint streaks of whitish tissue, turning to chocolate brown on exposure, exuding a colourless watery sap from the cambium. *Leaves* alternate, 2.5-4.5 by 1-2 in., elliptic-oblong to oblong-ovate or lanceolate, acute, subacute or shortly acuminate, sometimes with blunt tip, margins revolute, thinly coriaceous, glabrous, often slightly puberulous along the midrib above, somewhat unequal at the base, turning black in drying; main lateral nerves 4-7 on either half with 1-2 intermediate ones between each couple, arched, slender; tertiaries very lax, inconspicuous; base acute or obtuse; petiole .5-1 in. long, finely channelled, puberulous. *Inflorescence* a terminal corymbose panicle, 3-5 in. long and almost as broad; branches and pedicels buff puberulous; pedicels short; buds oblong. *Flowers* white, sweet scented, 2-sexual. *Calyx* very small, salver-shaped, hirsute, 5-toothed. *Petals* 5, valvate, about .16 in. long, oblong, rather fleshy, inflexed at the tip, quite free, glabrous. *Stamens* 5, alternating with the petals; filaments inserted below the ovary, slightly dilated downwards, glabrous; anthers sagittate, dorsifixed, slightly puberulous, dehiscing longitudinally. *Ovary* hairy, 1-celled, with two superposed pendulous ovules; style 1, persistent, slightly excentric in flower, but gradually pushed downwards as the fruit develops, ultimately forming a beak near the base of the mature fruit. *Fruit* a compressed drupe, .3 by .25 in., obovoid, longitudinally striated, hirsute, furnished with a lateral orbicular shield-like appendage which goes on growing as the fruit develops and turns deep reddish-brown in ripe fruit. *Seed* 1, conforming with the fruit, albuminous.*

* My specimens of this tree have been identified at Sibsput as *A. Benthamina*, but the above description does not quite agree with that given for that species in Fl. Br. Ind. It may turn out to be a new species or at least a variety peculiar to Assam.

74731



Dhansiri Reserve, NOWGONG, N. CACHAR[®] HILLS and KHASI and JAINTIA HILLS up to 4000 ft.

Wood deep tan brown weighing 45 lbs. per c. ft., fine grained, polishes well, medullary rays of two kinds, very fine with a few slightly thicker, joined by many fine transverse bars. The leaves emit a bad smell when bruised.

Flrs. 4-5. Fr. 9-1.

2. MAPPIA Jacq.

Mappia foetida Miers.

Generally a tree with a strong smell, which when old shows a climbing tendency and splits into numerous separate stems. *Bark* greenish-grey, wrinkled; young shoots pubescent. *Leaves* alternate or subopposite, 2-8 by 1-3 in., ovate or elliptic, acute or acuminate, entire, sub-coriaceous, at first thinly pubescent, especially underneath afterwards glabrescent; lateral nerves 4-7 on either side of the midrib, the lowest basal or sub-basal, much arched, tertiaries transverse; base more or less rounded or subacute; petiole 1-2 in. long, channelled, puberulous. *Flowers* small, yellow, with an unpleasant smell, in terminal corymbose panicles; pedicels short, strigose. *Calyx* minute, 5-lobed, hairy. *Petals* 5, villous within. *Stamens* 5, hypogynous, cup-shaped. *Ovary* hairy, 1-celled; ovules 2, pendulous; style terminal. *Fruit* an oblong drupe up to .75 in. in length; seed solitary, pendulous, albuminous; radicle superior.

Only once found near Borjan, Makum Range, Dist. LAKHIMPUR. Distribution MYSORE and the NILGIRIS.

Wood soft and porous.

Flrs. 3-7.

3. GOMPHANDRA Wall.

Gomphandra axillaris Wall.

A large shrub or small tree with glabrous twigs, buds pubescent. *Leaves* alternate, 2-farious, 3-7 by .5-2.5 in., oblong or lanceolate, acuminate, often abruptly thinly subcoriaceous, glabrous on both surfaces, paler beneath; lateral nerves 7-9 on either half, slender, raised beneath, oblique, specially the sub-basal pair, tertiaries more or less transverse and subparallel, specially towards the margin, nervules laxly reticulate; base rounded or narrowed; petiole .2-.5 in. long, stout, channelled. *Flowers* small, unisexual or polygamous in puberulous axillary or extra-axillary paniculate, few flowered cymes up to .4 in. long. *Calyx* minute, cup-shaped, 4-5 toothed. *Petals* about .15 in. long, inserted on a short hypogynous disk and connate into a tubular campanulate corolla, much exceeding the calyx lobes, ovate, inflexed at the tip, ultimately spreading. *Stamens* 5, alternating with the petals; filaments thick, flat on the back and hollowed near the top in the front to receive the anthers, pilose with glandular hairs at the apex, which exceed the anthers; anthers pendulous from the apex of the filament.

Ovary rudimentary in the male and oblong and obtusely 4-5 gonous in the female flr., 1-celled; stigma discoid*. *Fruit* drupaceous, 5-6 in. long, oblong, crowned by the remains of the stigma. *Seed* large, striated outside.

Nongkha-KHASI & JAINTIA HILLS, Balijan, Tengalibam. Prains collector (!)
LUSHAI-Præzer (!) Gauhati-Jenkins (!).
Flrs. 5-7. Fr. 10-12.

4. MIQUELIA Meissn.

Miquelia Kleinii Meissn.

A fairly large harsh climber with corky bark and very large wood vessels. *Leaves* alternate, 5-9 by 1.5 in., elliptic oblong or lanceolate, abruptly acuminate, generally entire, membranous or thinly coriaceous, strigose when young; main lateral nerves 7-12 on either side of the midrib, arcuate, the lowest from near the base; petiole 1.5-2 in. long. *Flowers* greenish in pubescent heads, dioecious. *Perianth* supported by a 3-5 cleft involucre. MALE FLOWER HEADS 15-20 flowered; peduncles 1-2 in. long, filiform, racemously disposed on a short supra-axillary protuberance. *Perianth* separated from the involucre by a pedicel, up to .15 in. long, puberulous outside, 4-5 lobed, lobes elliptic valvate, equalling or slightly shorter than the tube. *Filaments* very short; anthers oblong. FEMALE FLOWER HEADS about 10-15-flowered; peduncles solitary, about .5 in. long, thick, involucre persistent. *Perianth-tube* short or 0, lobes reflexed. *Staminodes* minute. *Ovary* ovoid; stigma sessile, 4-lobed. *Fruit* a compressed drupe, 5-6 by .3 by .2 in., tubercled outside, 1-seeded, putamen pitted; albumen copious; radicle superior; cotyledons flat, leafy, as broad as the seed.

Dikrang in LAKHIMPUR, Joboka, Mohmara, Dumardalang in SIBSAGAR, Charduar in DARRANG, KHASI HILLS. Not very common.
The thin flexible shoots are used for binding purposes.

Flrs. 4-5. Fr. 10-11.

5. NATSIATUM Ham.

Natsiatum herpeticum Ham. Vern. *Target-riube*, Miri.

A semi-herbaceous climbing shrub with tuberous roots and harsh stem, shoots densely strigose; wood very porous. *Leaves* alternate, 3-6 by 2-5 in., broadly ovate, acute or acuminate, repand or dentate, membranous, scabrid with adpressed stiff white hairs, palmately 7-9 nerved at the base, each main nerve giving off 1-2 lateral ones; base truncate or abruptly cuneate; petiole 2-6 in. long, very strigose. *Flowers* greenish-yellow, dioecious, bracteate, in supra-axillary hirsute, slender, spiciform racemes up

* The discoid stigma on the top of the ovary is regarded by some to be in reality on accrescent epigynous disk concealing the true style and stigma—F. B. I.

to 4.5 in. long ; bracts linear ; pedicels up to .15 in. *Calyx* lobes valvate, linear-lanceolate, shaggy outside with coarse hairs. *Petals* 5, up to .1 in. long, alternating with calyx-lobes and slightly longer than them, lanceolate, hairy. *Fertile stamens* opposite the calyx-lobes ; filaments short ; anthers bright-yellow, sagittate. *Staminodes* (in female flowers) subulate. *Ovary* 1-celled, hairy ; style 2-3 fid. *Fruit* a compressed ovate drupe, somewhat oblique and tapering, .3 by .25 by .2 in., rugose ; stone crustaceous ; seed solitary ; albumen fleshy ; cotyledons leafy.

Along the Buri-suti in the N. E. FRONTIER DISTRICT, the Mikir Hills Namchang (foot of the NAGA HILLS), LAKHIMPUR, SIBSAGAR, GOALPARA, SYLHET and foot of the KHASI HILLS.

The leaves and tender shoots are eaten by the Miris cooked as a pot herb, especially with fish.

Firs. 12-1. Fr. 1-2.

6. IODES Bl.

Iodes Hookeriana Baill.

A fairly large climbing shrub ; young stems covered with soft bristles, old with corky warts. *Leaves* opposite or subopposite, 4-8 by 1.5-3.5 in., oblong-ovate or obovate, abruptly acuminate, entire, subcoriaceous, glabrous above, pilose beneath along the nerves, strongly and closely reticulate ; lateral nerves 7-9 on either half, very prominent beneath ; base rounded or shallowly cordate ; petiole .3-.7 in. long, shaggy with brown bristles. *Inflorescence* extra-axillary, cymose, the lower peduncles often reduced to tendrils. *Flowers* diœcious. *Calyx* minute, salver-shaped, with 5 short deltoid lobes. *Petals* 5, valvate, oblong, thick, free in the male flower, combined and tubular in the female, hairy outside at the base. *Stamens* 5, hypogynous, opposite the petals or corolla-lobes and shorter than them ; filaments glabrous ; anthers sagittate. *Ovary* 1-celled with 2 pendulous ovules ; style 0 ; stigma 5-lobed. *Fruit* a drupe of the size and shape of a large almond, supported by the persistent calyx, orange-red when ripe ; seed solitary, ovate ; albumen fleshy ; cotyledons flat, leafy.

Barpathar, SIBSAGAR ; also pabhoi, DARRANG and KHASI HILLS (Hooker).

Firs. cold season. Fr. 7-9.

Cardiopteris lobata R. Br.—is a curious climbing herb of doubtful affinity with a milky juice found in forest glades in SIBSAGAR, and possibly elsewhere. The *leaves* are deciduous, polymorphous, generally palmately 7-9 nerved at the base, membranous, long-petioled. The fruit is surrounded by a thin, shining, silky obovate obcordate wing which is about 1 in. long and .75 in. broad. Vern. *Lalruna-buphai-thup*, Lushai.

FAM. 38. AQUIFOLIACEÆ (ILICINÆ).

Trees or shrubs generally evergreen. *Leaves* alternate, simple, glabrous, usually coriaceous ; stipules 2, minute or 0. *Flower* regular, usually dioecious, sometimes bisexual, small, in axillary fascicles, umbels or congested cymes. *Calyx* 3-6 cleft or lobed ; segments or lobes imbricate, persistent. *Petals* 4-5, rarely 6-8 or more or less connate in the male flowers, imbricate, deciduous. *Stamens* 4-5, adnate to the petals or free and hypogynous (imperfect) in female flowers. *Disk* 0. *Ovary* free, (rudimentary in male flowers), 3-16 celled ; style short ; ovules 1-2, pendulous. *Fruit* a drupe with 2 or more 1-seeded stones ; seed with a membranous testa ; embryo minute.

ILEX Linn.

The characters of the family.

Blaze oxidizes rapidly on exposure.

I. Leaves quite entire, flowers in umbellules :—

A. Flowers unisexual :—

a. Umbellules often arranged racemously, peduncles '3-8 in. long. Flowers 4-5 merous. Lofly tree ; branchlets pubescent, leaves thinly coriaceous. .. 1. *I. Godajam.*

b. Umbellules solitary, peduncles '5-1 in. long. Flowers 4-5 merous ; middle-sized trees, branchlets glabrous, leaves membranous. .. 2. *I. sulcata.*

c. Umbellules cymose, solitary or crowded on a short rachis ; peduncles '3-6 in. long. Flowers 4-6 merous. Moderate sized tree, branchlets green, glabrous ; leaves thickly coriaceous. .. 3. *I. venulosa.*

B. Flowers bisexual :—

Umbellules mostly solitary, sometimes several on short shoots. Flowers 4-merous. .. 4. *I. Doniana.*

II. Leaves serrate or serrulate :—

1. Leaves not gland dotted :—

a. Fem. flrs. fascicled :—

Male flowers in dense corymbose cymes, branched from near the base. Flowers 4-5 merous. .. 5. *I. theaeifolia.*

Male flrs. in peduncled umbellules, peduncles '2-5 in. long. Flowers 4-merous. .. 6. *I. embetioides.*

Male flrs. fascicled. Flowers often more than 5-merous. Leaves membranous, strongly reticulate beneath. .. 7. *I. fragilis.*

b. Fem. flrs. solitary :—

Male flrs. on peduncled umbellules, peduncles '5-1 in. long. Flrs. 4-merous. .. 8. *I. Griffithii.*

2. Leaves dotted with raised dark glands beneath :—

Fem. flrs. mostly solitary. Flrs. 4-merous. .. 9. *I. Thomsonii.*

1. *Ilex Godajam* Coleb. Vern. *Hati-kerepa*, Ass. (Sib.); *Born-bokul*, Ass. (Larr.); *Theng-tuni*, *Theng-sang-proth-arong*, Mik.; *Theny-ngoithoh*, Tipp.

A large deciduous tree with spreading branches attaining often over 100 ft. in height and 8 or 9 ft. in girth; young shoots and inflorescence pubescent. *Bark* grey, plain, excepting for warts and fine close horizontal wrinkles; inside granular or mealy, at first light brown, but soon turning dark-brown or black. *Leaves* 3-5 by 2-2.5 in., ovate elliptic or oblong, generally bluntly short acuminate, entire, often undulate, thinly coriaceous, glabrous and shining above, pale beneath; mid-rib and main lateral nerves often thinly pubescent beneath when young; lateral nerves 8-10 on either half, slender, arched; base generally acute; petiole .5-1 in., puberulous or glabrescent, channelled; stipules minute. *Flowers* about .15 in. diam., 4-5 merous, pale, fragrant; male flowers in simple or panicle, pedunculate umbels; panicles up to 2 in.; peduncles .3-8 in. long, pedicels slender up to about .1 in. long. *Calyx-lobes* orbicular, more or less ciliate. *Petals* broadly obovate or ovate oblong, slightly united at the base about .1 in. long. *Filaments* very slender, exceeding the petals. *Fruit* ovoid, about .1 in. across, sulcate, with 4-6 stones.

Along the foot of the MIKIR HILLS from Amguri in NOWGONG to Barpathar in SIBSAGAR, SYLHET, GARO HILLS and N. CACHAR HILLS.

Wood of a dull pale colour weighing about 40 lbs. per c. ft., not used except as firewood.

Frs. 2-4. Fr. 4-6.

2. *Ilex sulcata* Wall. Vern. *Bikha-kulia*, Ass. (Darr.) *Kotoki*, Ass. (Kam.); *Cheknan*, *theng-pisuni*, Mik.; *Bol-thajong*, *Bol-mikachhak*, Garo; *Dieng-jali*, Khasi.

Usually a middle-sized deciduous tree, but sometimes as large as the preceding species, very young branchlets thinly pubescent. *Bark* greyish-white outside; plain or with shallow horizontal wrinkles; blaze greenish next to the cuticle, deeper layers cream-coloured, pinkish near the cambium, but all soon turning black on exposure, soft, granular. *Leaves* elliptic, elliptic-oblong or ovate, 2.5-5.5 by 1.3-2.5 in., somewhat abruptly acuminate, quite entire and with a thin translucent margin, membranous, glabrous, pale beneath; lateral nerves 8-12 on either half, very slender, somewhat irregular, anastomosing into loops at the extremities; tertiaries very scanty, laxly reticulate; base acute; petiole .4-8 in. long, margined, puberulous when young. Umbels 12-20 flowered, generally solitary below the leaves on leaf-bearing branchlets; peduncles .6-1 in. long, compressed towards the apex; pedicels about .1 in. long, both more or less puberulous. *Calyx-lobes* orbicular, pubescent outside. *Petals* 4-5 in the male flowers, up to 6 in the female, orbicular or broadly oblong, glabrous. *Filaments* slightly longer than the petals, glabrous. *Drupe* .2 in. across, globose; stones up to 8, trigonous.

NOWGONG and DARRANG generally in deciduous forests, KAMRUP—Mann (1), low elevations in KHASI HILLS and GARO HILLS.

Wood white, compact and very fine-grained; pores very small and scanty. Weight about 50 lbs. per cu. ft. capable of being used for scabbards, platters and toys.

Flrs. 3-4. Fr. 5-6.

3. *Ilex venulosa* Hk. f. Vern. *Dieng-lalih*, *Dieng-soh-saw*, Khasi.

A moderate-sized tree with green glabrous branchlets covered usually with large lenticels. *Bark* grey, fairly smooth, lenticellate; blaze greenish-white, turning brownish, edges (layers below the dead tissue) green. *Leaves* 3-7.5 by 1.2-2.5 in., oblong or elliptic-oblong, usually abruptly caudate, quite entire, glabrous, brownish-red when young, coriaceous, midrib prominent beneath; lateral nerves strong, 10-14 on either half, arcuate towards the free end, anastomosing into loops near the margin, nervules laxly reticulate; petioles .5-1.2 in. long, stout, channelled. *Flowers* whitish, about .1 in. across, polygamous, 4-6 merous; male flowers in slender cymose umbellules, usually branched from a rachis up to 1 in. long; female flowers in axillary peduncled umbellules, either solitary or crowded on a short rachis up to 1 in. long; peduncles .3-6 in. long, stouter than in male flowers; pedicels up to .15 in. *Calyx* broad ovate, obtuse. *Petals* oblong or obovate, combined at the base in both sexes. *Stamens* inserted between them at the base. *Stigma* large discoid, subsessile. *Drupe* globose, red when ripe, .15 in. across, stones 4-6.

KHASI HILLS, 4000-5500 ft.

Flrs. 4. Fr. 11.

4. *Ilex Doniana* DC. Syn. *Ilex excelsa* Wall. Vern. *Dieng-soh-syrtet*, *Dieng-soh-tyrlang*, *Dieng-lali*, *Dieng-soh-lali*, Kh.; *Dieng-lihsyng*, Synt. *Bol-ai*, Garo.

A small or medium sized tree; young shoots pubescent or nearly glabrous beneath, often stout. *Bark* light to dark-grey with horizontal wrinkles and covered with lenticular warts, otherwise smooth, blaze cheesy pale-dun or yellowish white, darkening and turning, rather dirty brown to almost black on exposure. *Leaves* 2-3.5 by 1.25-1.75 in. ovate, elliptic or elliptic-oblong, acuminate in some forms, entire, subacute, thin or subcoriaceous when mature, glabrous, dark-green and shining above, glabrous or pubescent beneath; lateral nerves 6-9 on either half, slender, arcuate, anastomosing near the margin; petiole .3-1 in. long, slightly channelled, puberulous or glabrescent. *Flowers* 2-sexual, 4-5 merous, .15 in. across in axillary pubescent peduncled umbels, sometimes in short panicles; peduncles .2-5 in. long, stout, up to 15 flowered; pedicels about .1 in. long. *Calyx*-lobes broad ovate to rounded, more or less hirsute outside at least when young, ciliate. *Petals* suborbicular-oblong or obovate, united at the base. *Stamens* alternating with the petals and inserted

at their base. *Drupe* 2 in. across, globose, bright red with 4-5 trigonous stones.

KHASI & JAINTIA HILLS generally above 3000 ft., N. CACHAR HILLS about 1600 ft., GARO HILLS-Dambu Reserve.

Wood brownish or greyish white, medullary rays broad with very fine ones between, pores small; takes a fine polish—not used.

Frs. 3-4. Fr. 11-12.

The following forms may be mentioned.

Form 1. young shoots and undersurface of leaves at least along the midrib pubescent. Leaves often elliptic oblong and generally with subacute tip, umbels often in short panicles.

GARO HILLS, NORTH CACHAR; Jowai—KHASI HILLS etc.

Form 2. Branchlets stout, usually glabrous. *Leaves* entirely glabrous, sub coriaceous, broader than in the last, acuminate; lateral nerves somewhat distant, usually not more than 6, umbels never panicked.

KHASI HILLS between 4000 & 6000 ft.

5. *Ilex theæfolia* Hk. f. Vern. *Dieng-soh-tyrlong-kynthi*, *Dieng-shieng*, Khasi.

A moderate-sized to small tree; young parts and inflorescence puberulous. *Bark* grey, lenticelled, thin; blaze pale-brown with white streaks, granular. *Leaves* 1.5-3 by .6-1.4 in., elliptic-oblong, lanceolate or oblong-lanceolate, shortly caudate acuminate, serrate or serrulate, coriaceous, shining above; lateral nerves 7-9 on either half, anastomosing near the margin, slender, not prominent; base acute, cuneate or narrowed and obtuse; petiole up to .3 in. long, slightly margined, channelled. *Flowers* whitish, 4-5 merous, about .2 in. across, male flowers in dense axillary corymbose cymes branched from the base, up to .5 in. long; pedicels slender up to about .2 in. long, female flowers fascicled or crowded on short axillary protuberances or branches; pedicels stouter than in male frs.; about .2 in. long. *Calyx* broad ovate, subacute, round, ciliolate. *Petals* broadly obovate or obovate-oblong, connate at the base in male, free in female frs. *Stamens* longer than the petals in male flowers; staminodes in female frs. shorter than the petals. *Drupe* globose about .2 in. across, reddish-brown when ripe; stones 3-4.

KHASI HILLS 4000-6000 ft.

Frs. 4-6? Fr. 7?

6. *Ilex embelioides* Hk. f. et Thom.

A small tree. *Bark* thin, greenish-grey, nearly smooth, distantly warty and with faint horizontal wrinkles; blaze dull greenish white, turning dirty on exposure, granular; shoots and inflorescence finely puberulous. *Leaves* 2-farious, deep green, 1.2-2.5 by .5-.8 in., elliptic to oblong-lanceolate, caudate with a blunt apiculate tip, with few distant spinous teeth or nearly entire, shining above, finely puberulous along midrib on both surfaces, ultimately glabrous; base acute or cuneate; petiole channelled up to .25 in. long. *Flowers* 4-merous, white, about .1 in. across. *Males* in peduncled umbellules, clustered at the ends of branches or leaf axils, often on very short branches, sometimes solitary; peduncles

of umbellules 2-5 in. long; pedicels slender, short; buds globose. *Female* flowers in fascicles at the leaf axils often on very short branches. *Calyx* lobes puberulous outside, broad, subacute or obtuse, ciliate. *Petals* suborbicular, ovate or oblong, cuneate at the base in both sexes. *Stamens* nearly as long as the petals, inserted at their base and alternating with them. *Pistillode* in male flower globose. *Drupe* globose, 1.5-2 in. across, with 1-3 stones.

KHASI HILLS 4000-6000 ft.

Flrs. 4-5. Fr. 10.

7. *Ilex fragilis* Hk. f. Vern. *Dieng-lali-iong*, Khasi.

A small tree, with fragile branches and greyish-white warty bark; blaze pale yellow, turning blackish on exposure. *Leaves* 2.3-5 by 1-2.2 in., elliptic or ovate, acuminate, serrate or serrulate, teeth generally apiculate, membranous, glabrous, midrib and main lateral nerves prominent beneath, the latter 6-9 on either half, tertiaries distant, more or less transverse and raised; forming large strong reticulations with the lateral nerves, nervules fine; base cuneate to rounded; petiole winged up to .25 in. long. *Flowers* white, up to about .15 in. across; both males and females fascicled, often from short peduncles; pedicels up to .2 in. long. *Calyx* lobes 5-8, rounded, somewhat unequal, ciliate. *Petals* 5-8, combined at the base in both sexes, suborbicular or broad-oblong to ovate, obtuse. *Stamens* as many as the petals, shorter than them and inserted at their base; filaments very short. *Stigma* tumid. *Drupe* globose, red, .2 in. across, crowned by the stigma with 5-8 stones.

KHASI HILLS 5000-6000 ft.

Wood white, not used.

Flrs. 4-5. Fr. 7-8.

Hooker describes the flowers as pentamerous but from a large number of specimens examined by me, I conclude they are 5-8 merous.

8. *Ilex Griffithii* Hk. f. Vern. *Kynja-jakrai*, Khasi.

A large bushy evergreen shrub or small tree with spreading branches; branchlets virgate, sparingly pubescent or glabrescent; bark grey or dark-brown, thick, nearly smooth, lenticellate. *Leaves* 1.5-3 by 1-1.5 in., obovate or elliptic, acute, obtuse or rounded at the apex, finely serrulate, thinly coriaceous, glabrous, dark-green and shining above, pale beneath; midrib channelled above, prominent beneath; lateral nerves 6 or 7 on either half, very slender; base acute or cuneate; petiole .25-3.5 in. long, channelled. *Flowers* 4-merous, pale-white; males about .2 in. across, in umbel-like compound cymes; pedicels slender. *Female* usually solitary, about .25 in. across, axillary; pedicels quadrangular, stout, about .2 in. long. *Calyx-lobes* orbicular, ciliate. *Petals* broad, oblong, connate below in both sexes. *Stamens* inserted on the corolla. *Ovary* globose; stigma sessile. *Drupe* globose, about .25 in. diam., black when ripe; stones 1-3, rarely 4, coriaceous.

Found in damp places in the plains, e.g. Bechapati, Doloni near Laluka, LAKHIMPUR; Sepakhati, Deroi Reserve and Gaurisagar in SIBSAGAR, SYLHET also KHASI HILLS, 4,-6000.

Flrs. 3-4. Fr. cold season.

9. *Ilex Thomsonii* Hk. f.

A shrub or a small tree attaining 18 ft., with a dense crown; young shoots and inflorescence puberulous. *Leaves* 5-15 by 3-6 in., obovate or oblanceolate, acute or subacute, apiculate, margin with few distant teeth, coriaceous, glabrescent above, dotted with dark raised glands beneath; lateral nerves indistinct, 4-6 on either half; base narrowed into the short petiole. *Flowers* 4-merous, white, nearly 1 in. across. *Males* in axillary, peduncled few flowered (usually 3-flowered) cymes; peduncles sometimes 1-flowered, slender up to 3 in. long; pedicels up to 15 in. long. *Females* usually solitary on axillary peduncles; pedicels and peduncles thickening with age. *Calyx* suborbicular or broad ovate. *Petals* suborbicular obovate or oblong, connate at the base in both sexes. *Stamens* nearly as long as petals and inserted at their base. *Stigma* sessile; pistillode in male flowers globose. *Drupe* up to 25 in. across, black when ripe, globose; stones usually 2, planoconvex.

KHASI HILLS 4000-5000 ft.

Flrs. 5-6. Fr. 12.

Fam. 39. CELASTRACEÆ.

Trees or erect or climbing shrubs, sometimes with spinescent branches. *Leaves* opposite or alternate, simple, stipules caducous or 0. *Flowers* regular, small, 2-sexual or polygamous, usually cymose. *Calyx* small, 4-5 lobed, persistent; lobes imbricate. *Petals* 4-5, rarely 0, imbricate, inserted on or below the disk. *Disk* generally conspicuous lobed or entire. *Stamens* as many as petals, inserted under or on the margins of the disk and alternating with the petals, or when the petals are absent opposite to the calyx lobes. *Ovary* 2-5 celled, free on the disk or immersed in it; ovules usually 2 in each cell, rarely 1 or more than 2; style none or 1, rarely 2, short; stigma simple or lobed. *Fruit* capsular, berry-like or drupaceous. *Seeds* usually arillate, sometimes winged; albumen fleshy, sometimes 0.

- I. Leaves opposite :—
 A. Petals free ; capsule 3-5-celled :—
 Trees or erect or climbing shrubs ;
 ovules 2 in each cell ; petals not
 pitted.
 Trees or erect shrubs ; ovules 1 in
 each cell ; petals pitted.
 Trees ; petals continuous with the
 lobes of the disk, crested ; ovules
 4 or more in each cell of the ovary.
 B. Petals connate at the base ; capsule
 1-celled, 1 seeded.
- II. Leaves alternate :—
 A. Inflorescence paniculate or racemose :—
 Scandent shrubs ; leaves serrate ; ovary
 not bearded ; style 1.
 Trees ; leaves entire ; styles 2.
 B. Inflorescence of dichotomous cymes :—
 Ovary sunk in the disk : trees
 or erect shrubs.
- .. 1. *Euonymus*.
 .. 2. *Glyptopetalum*.
 .. 3. *Lophopetalum*.
 .. 4. *Microtropis*.
 ... 5. *Celastrus*.
 .. 6. *Kurrimia*.
 .. 7. *Gymnosporia*.

1. EUONYMUS Linn.

Trees or shrubs, sometimes trailing or creeping with adventitious roots, rarely scandent. *Leaves* usually opposite ; stipules caducous. *Flowers* bisexual ; inflorescence usually axillary and 2-3 cymously cymose. *Calyx* 4-5-fid ; lobes spreading or recurved. *Petals* 4-5 ; stamens 4-5, inserted on the disk ; anthers broad, 2-celled. *Disk* large, fleshy, 4-5 lobed. *Ovary* sunk in the disk, 3-5 celled ; style short or 0 ; stigma 3-5 lobed ; ovules 2 in each cell, attached to the inner angle, one ascending and sub-basal and the other suspended and on the axis. *Capsule* 3-5 lobed, angled or winged, 3-5 celled, sometimes by abortion 1-celled, coriaceous, rarely echinate ; cells 1-2 seeded, loculicidal. *Seeds* covered by aril, albuminous.

- I. Fruits unarm'd :—
 A. Flowers over .5 in. across ; cyme 3-flowered,
 peduncles fairly stout up to 2 in. long.
 B. Flowers under .5 in. across, cymes usually
 more than 5 fld.* :—
 1. Leaves always entire ; flowers usually
 5-merous.
 2. Leaves usually serrulate or serrate ;
 flds. 4-merous :—
 a. Trees :—
 i. Leaves not bullate ; petals not
 thick :—
 Peduncles rather stout ; petals
 ovate or oblong.
 Peduncles capillary ; petals
 orbicular ; capsule deeply
 lobed.
 ii. Leaves bullate ; petals thick.
 b. Usually climbing-sometimes erect
 shrubs :—
 i. Peduncles under .75 in. long,
 never filiform ; style
 conspicuous :—
- .. 1. *E. grandiflorus*.
 .. 2. *E. attenuatus*.
 .. 3. *E. Hamiltonianus*.
 .. 4. *E. Lawsonii*.
 .. 5. *E. bullatus*.

* 3 fld. in some forms of *E. Hamiltonianus*.

Climbing by means of adventitious roots or erect; nervules of leaves conspicuously reticulate. Flrs. 25 in. across when fully expanded.

.. 6. *E. theae folius*.

Scandent; leaves small, nervules not conspicuous. Flowers small; peduncles flattened.

.. 7. *E. vagans*.

ii. Peduncles usually over 1 in. long, filiform; style very short or obsolete; leaves with conspicuous nervules

.. 8. *E. frigidus*.

II. Fruit echinate :—

Creeping shrub; leaves obovate or oblanceolate.

.. 9. *E. cinereus*.

1. **Euonymus grandiflorus** Wall. Vern. *Si-san, Soh-iong-trong-kynthei, ja-minrei-dykhar, Dieng-sit-um, Kh. Goldari, Nep.*

Small tree or large shrub, with somewhat obscurely quadrangular branchlets. Bark grey or brownish grey, sometimes almost blackish outside with shallow vertical fissures; white inside. Leaves 1.5-4.5 by .8-1.6 in., obovate to oblong or elliptic, bluntly short acuminate or acute, serrulate, glabrous, subcoriaceous, nerves impressed above; lateral nerves fine, somewhat indistinct on either half; base acute or cuneate; petiole .2-.25 in. long. Peduncles usually 3, less often up to 5-flowered, 1-2 in. long, slender, flattened; pedicels .2-.3 in. long. Flowers about 1 in. across, greenish or yellowish-white, 4 merous, *Calyx* lobes rounded. *Petals* orbicular or nearly so. *Capsule* .3-.5 in. across, sharply 4-gonous, capped by the short style; seeds with scarlet aril.

KHASI & JAINTIA HILLS 5000-6000 ft.; Jeyapore-LAKHIMPUR, (Sheet 113 P. T. C.)

Flrs. 5. Fr. 10.

var. A shrub; leaves linear to narrow oblong-lanceolate, .3-.7 in. broad; nerves quite distinct.

Umjasai, Nongkersin forests, KHASI & JAINTIA HILLS.

2. **Euonymus attenuatus** Wall.

A tall shrub or small tree with spreading branches and greyish-bark. Leaves 2.5-5.5 by .7-1.7 in., lanceolate-oblong or oblong-elliptic, bluntly acuminate, sometimes abruptly entire, glabrous, coriaceous; lateral nerves 6-8 on either half, faint; base cuneate or acute, petiole .2-.5 in. long. Flowers usually 5-merous, .25 in. across, in dichotomously branched peduncled cymes. Peduncles thickening in fruit, axillary or from axils of bracts, .5-2 in., long; pedicels .15-.3 in. long. *Calyx* lobes obtuse, unequal. *Petals* .25 in., obovate-orbicular. *Capsule* red, obovoid, 5, sometimes 4-lobed; aril yellow, seeds black.

Dulong Reserve—LAKHIMPUR, Banks of Loobah Lake—SYLHET, KHASI & JAINTIA HILLS—2-4000 ft.

The leaves in some forms are narrowly lanceolate.

3. *Euonymus Hamiltonianus* Wall. *Dieng-soh-sat-khlaw*, *Jamin-rei-dkhar*, Kh.

A small to medium sized tree attaining about 40 ft. in height and nearly 6 ft. in girth; bark grey or greyish-brown, thick, reticulately furrowed and rough outside; white and soft inside. *Leaves* opposite or subopposite, 2-6 by 1-2·2 in., lanceolate, elliptic to oblong or sometimes ovate elliptic, acuminate, finely serrate with deciduous cuspidate teeth, thin; main lateral nerves 7-12 on either half, arcuate; petiole 2-6 in. long. *Flowers* 4-merous, dull-white, 3 in. across in few flowered 2-3-chotomous peduncled cymes; peduncles from leaf axils or often extra-axillary at the base of the growing shoot, flattened, 4-1·5 in.; pedicels rather thick, 1-3 in. long. *Calyx* lobes 1-12 in. broad, inner pair larger and subpetaloid, generally broader than long, rounded, ultimately reflexed. *Petals* broadly oblong or ovate oblong, entire, margins reflexed. *Stamens* about half as long as the petals. *Style* prominent, nearly as long as the stamens. *Capsule* 3 in. long, turbinate, deeply 3-4 lobed; seeds enclosed in scarlet aril.

KHASI HILLS 5000-6000 ft., often near villages.

Wood yellowish white, soft, close grained, med. rays extremely fine, takes a good polish. According to Gamble used for carving into spoons and in China for engraving. Not used in this province.

Flrs. 4-5; sometimes 10-second flush? Fr. 10-11.

Var. Cymes not branched usually 3-flowered, peduncles 25-5 in. long.

4. *Euonymus Lawsonii* C. B. Clarke and Prain. in Journal As. Soc. of Bengal LXXIII, P. 195. Vern. *Soh-dadin*, Kh.

A small tree; bark grey, corky and reticulately fissured outside; white and finely fibrous inside. *Leaves* 2-5 by 1-2 in., elliptic, elliptic-oblong or lanceolate, acuminate, serrate, thinly coriaceous; lateral nerves 7-10 on either half, conspicuous on both surfaces, arcuate, tertiaries prominently reticulate; base cuneate to subrounded; petiole up to 25 in. long. *Flowers* about 2 in. across, dull-white, 4-merous; peduncles 3-7 in. long, slender; dichotomously branched, few flowered from leaf axils or axils of bracts; pedicels filiform, 15-3 in. long. *Calyx* segments broad, obtuse or rounded, concave, entire. *Petals* greenish, broader than long, rounded, revolute at the top. *Capsule* deeply 4-lobed; lobes compressed, 5-6 in. across; seeds with orange aril.

KHASI HILLS 4000-5500 ft., Bishops falls, Mawmulah, Nongstien etc.

Flrs. 5-6. Fr. 10.

5. *Euonymus bullatus* Wall.

A small tree 15-20 ft. in height; branchlets stiff. *Leaves* 3-8 by 2-3·5 in., ovate to lanceolate, often tapering to a fine point, entire or serrulate, coriaceous when mature, bullate with depressions above along the lateral nerves, which are 5-8 on either side, arcuate, very prominent beneath, tertiaries indistinct; petiole 3-6 in. long, stout, channelled. *Inflorescence* 3-5 in. long,

umbellately or repeatedly 2-chotomously branched. *Flowers* 2 in. across, 4-merous. *Petals* square, thick, red. *Ovary* sessile. *Fruit* 4-gonous, obconic, about 4 in. long.

SYLHET-Wallich! KHASI and JAINTIA HILLS, Cherapunji-Mann! Mausmai-Clarke!—Mamluh, MANIPUR, Watt.

Flrs. 2-5. Fr. 10-12.

6. *Euonymus theæfolius* Wall.

A shrub, sometimes trailing on other trees with adventitious roots, less often epiphytic on other trees, bark brownish or greyish-brown; in old stems rough with lines of lenticels. *Leaves* 2-4.5 by 7-2 in., very variable, usually lanceolate, oblong- to elliptic or ovate, acuminate, serrulate or entire; lateral nerves prominent on both surfaces, 7-10 on either half, arcuate, anastomosing near the margin, tertiaries conspicuously reticulate; base acute or cuneate; petiole channelled, 2-3 in. *Flowers* 4-merous in once dichotomously branched peduncled cymes 25 in. across; peduncles 25-5 in. long; pedicels 1-2 in. long. *Calyx lobes* rounded, broader than long. *Petals* red (or white?) about 2-12 in., orbicular, short clawed, entire. *Stamens* smaller than the petals. *Style* short. *Capsule* about 3 in. across, globose, obscurely angled or not, aril yellow or orange.

KHASI HILLS 5000-6500 ft. in shady situations.

Wood light-brown, pores more numerous in spring wood, medullary rays few, very broad and distant and numerous close, with fine ones between; annual rings eccentric, takes a good polish, but liable to crack.

Flrs. 4-5. Fr. 10.

7. *Euonymus vagans* Wall.

A climbing shrub; branchlets quadrangular greyish and covered with warty lenticels when older. *Leaves* 1-2.3 by 5-1 in., ovate, elliptic or oblong lanceolate acuminate, sharply but somewhat distantly serrate, membranous; lateral nerves 5-7 on either half; petiole 1-1.5 in. *Flowers* 4-merous, small, greenish-white. *Cymes* peduncled, dichotomously once branched; peduncle 3-6 in. long, flattened; branches up to about 25 in. long; pedicels 1-2 in. long. *Calyx lobes* suborbicular, obtuse or rounded, *Petals* minutely crenate or nearly entire; style minute. *Capsule* "size of a pea minutely tubercled."—*Lawson in F. B. I.*

KHASI HILLS-5000 ft.

Flrs. 3-4.

Sub sp. *macrophylla*. A shrub creeping on trunks of trees by means of adventitious roots; branchlets with 4 sharp ridges, glabrous. *Bark* on old stems dark grey or brown to almost black, lenticellate and rather rough. *Leaves* 3-6.5 by 1.2-5.2 in., obovate, elliptic to oblong or oblanceolate, acuminate or acute, cuspidate serrate or serrulate, subcoriaceous, glabrous; lateral nerves 5-7 on either half, arched, tertiaries inconspicuous; base cuneate; petiole 5-5 in. *Calyx* spreading, broader than long, rounded with brown dots inside. *Petals* orbicular, often broader than long, erose, white, usually with close purplish-brown dots. *Stamens* 4; filaments very short. *Style* short. *Capsule* up to 3 in. across, globose, minutely verrucose, indistinctly 2-4 lobed, 1-4 seeded. *Seeds* about 15-1 in., aril orange red, testa brownish-grey, minutely reticulated.

Saral bhanga block-GOALPARA-Muktarchapar-an island opposite Dibrugarh on the Brahmaputra.

Growth of stem eccentric, annual rings widest on the side of the supporting tree, the original stem forming a vertical ridge on the outer side of the stem. Wood light brown, structure resembling that of *E. thecifolius*.

Flrs. 1-2. Fr. 12-1. (next year).

8. *Euonymus frigidus* Wall.

A shrub about 4-5 ft. high, stem brown, shining with round lenticels, branchlets sharply 4-angled, youngest channelled. *Leaves* 2.5-5.5 by .5-1.2 in., lanceolate or linear lanceolate, caudate acuminate, sharply serrate, glabrous, tough and thin; lateral nerves 8-12 on either half, irregular, arcuate, prominent beneath; base tapering; petiole .2-.4 in. long. *Flowers* .15 in. across, 4-merous, greenish-yellow in few flowered axillary and extra-axillary branched cymes; peduncles very slender, 1-1.5 in. long, branches filiform, .2-.3 in.; pedicels filiform, about .1 in. long. *Calyx lobes* suborbicular ovate, obtuse or rounded. *Petals* orbicular, entire. *Style* very short or 0? *Capsule* 4 lobed or winged or not lobed.

Flrs. 5-6. Fr. 9-11.

KHASI HILLS 5000-6000 ft.

Var. 1. A shrub creeping on trees, rock etc. by means of adventitious roots; stem greyish-brown, somewhat rough with lenticels; branchlets sharply 4-angled, youngest channelled. *Leaves* 1.7-3.5 by .8-1.5 in., lanceolate, oblong-lanceolate, elliptic-ovate to oblong, acuminate, sharply serrate, thinly coriaceous; lateral nerves 7-10, conspicuous, arcuate, anastomosing near the margin. *Flowers* apparently 4-merous. *Peduncles* slender, .3-5 in. long; pedicels filiform, .15 in. *Fruit* about .2 in. across, globose, not lobed; style 0, (?) aril yellowish.

Kynshi forests. KHASI & JAINTIA HILLS.

Fr. 10.

Var. 2. *elongata* King mss.—has leaves 6-8 by .25-.3 in.

MANIPUR—Watt!

9. *Euonymus cinereus* Lawson.

A scandent shrub which creeps on trees by means of adventitious roots, branches 4-gonous, grey, glabrous. *Leaves* 1.5-3 by .6-1 in., obovate or oblanceolate, membranous, pale beneath, serrate, glabrous; lateral nerves 3-7 on either side, very slender; petiole .2-.3 in. long, channelled. *Inflorescence* usually axillary; pedicels .15-.2 in. long. *Flowers* .2 in. across, 4-merous. *Sepals* ovate, acute. *Petals* 4, orbicular, toothed, except at the base. *Capsule* echinate, seeds subglobose.

Nambor Forests—Watt.

Flrs. 4-5.

Euonymus echinatus Wall.—A trailing evergreen shrub with numerous adventitious roots on the stem by means of which it climbs on trees and rocks; branchlets with 4 raised lines. *Leaves* 1-3 by .6-1.5 in., elliptic to ovate lanceolate, acute or acuminate, serrate, sometimes coarsely; thinly coriaceous, nerves conspicuous, lateral nerves 6-8 on either half; petiole

1-2.5 in. long. *Flowers* 4-merous in axillary cymes; peduncles .5-1 in. long; pedicels 1-3 in. long. *Calyx*-lobes entire, rounded. *Petals* orbicular, minutely toothed or nearly entire. *Style* thick. *Capsule* 3 in. across, globose, covered with conical tubercles; aril scarlet.

Rsong forests at 4200 ft.—Satynga, KHASI & JAINTIA HILLS. Material (My sheet No. 6473) rather incomplete for satisfactory determination.

2. GLYPTOPETALUM Thwaites.

Glyptopetalum Griffithii Prain.

A shrub about 8 ft. high, branchlets glabrous, often grooved, when young. *Leaves* opposite, extipulate, 3.5-6 by 1.5-2.7 in., elliptic-oblong to lanceolate, bluntly short acuminate, crenate-serrate, sometimes obscurely entire towards the base, thinly coriaceous, glabrous, lateral nerves prominent, 6-8 on either half, arcuate, upper end nearly parallel to the margin; base acute or subobtuse; petiole channelled, stout, .2-4 in. long. *Flowers* small, 4-merous, usually in axillary and terminal cymes; peduncles up to .4 in. long, sometimes obscure, branches .25-.4 in., but sometimes up to 1 in. (at least in fruit) long;* pedicels usually longer than the peduncles. *Calyx* persistent, lobes spreading, rounded, broader than long, about .1 in. across. *Petals* with 2 shallow pit-like depressions on the upper surface. *Stamens* inserted above the disk, connective dilated. *Disk* 4-lobed. *Ovary* immersed in the disk, 4-lobed, 4-celled; stigma capitate; ovule 1 in each cell, pendulous. *Capsule* .3-.6 in. across, globose, rugose outside, walls coriaceous. *Seeds* 1-4, suspended at the apex from a concave shield-like placental (?) outgrowth, covered with red aril, albuminous.

Pasighat—N. E. FRONTIER DISTRICT.

Fr. 12.

3. LOPHOPETALUM Wight.

Lophopetalum fimbriatum Wight. Vern. *Rumu*, Ass. *Sutrong*, Sylh., *Dieng-ja-rem*?, Khasi.

A large tree attaining nearly 100 ft. in height. *Bark* grey, rough outside with horizontal wrinkles, uniformly pink inside, branchlets glabrous. *Leaves* opposite or subopposite, 3-6 by 1.5 to 3.2 in., ovate or ovate-oblong, entire, shortly acuminate or acute, subcoriaceous; lateral nerves 10-12 on either half, arcuate, nervules conspicuously reticulate; base rounded; petiole .4-.8 in. long. *Flowers* dark-red, .4-.5 in. across, 5-merous in axillary or terminal divaricating, paniculate cymes, 1.5-4 in. long; pedicels up to .25 in. long, bracteoles minute. *Calyx* lobes short, broad, obtuse, erose. *Petals* continuous with the disk, persistent, .15 in. long, orbicular with a fimbriate crest. *Stamens* inserted on the disk. *Disk* large, 5-lobed. *Ovary* sunk in the disk, triquetrous, 3-celled, each cell with few superposed

* The branches are sometimes absent or obscure.

ovules on axile placentas, contracted into the short style.
Fruit not seen.*

Kwasang reserve, Barduar reserve-KAMRUP; Longai reserve-SYLHET; Shella-KHASI & JAINTIA HILLS? (materials insufficient for correct determination).

Wood considered to be one of the best for tea chests and said to be as good as *Poma* for this purpose.

Flrs. 4.

4. MICROTROPIS Wall.

Microtropis discolor Wall. Vern. *Togkhata*, Lush.;

A small glabrous evergreen tree or large shrub. *Bark* brown or grey exfoliating in rectangular or irregular flakes, .5-1 by .2-.5 in., thin; blaze finely fibrous, greenish-brown, brittle. *Leaves* opposite, 2-farious, stipulate, 2-5 by 1.2-2.5 in., elliptic to obovate or oblanceolate, abruptly caudate-acuminate, the extremity of the tail rounded but generally with a short cusp, quite entire, membranous, flat, glabrous, dark-green above, pale beneath; lateral nerves about 5-9 on either side of the midrib, indistinct; base cuneate; petiole .3-.6 in. long, channelled, margined. *Flowers* greenish-white, 2-sexual, 4-5 merous, in compact, pedunculate, axillary or more generally supra-axillary 3-chotomous, bracteate cymes; peduncles .1-.25 in. long; pedicels very short or 0. *Calyx-lobes* orbicular, about .05 in. across, imbricate, green but with a narrow brown margin. *Petals* about .15 in. long, elliptic, concave, imbricate. *Disk* obsolete. *Filaments* very short, subulate. *Ovary* free, 2-3 celled with 2-collateral ovules in each; style very short. *Fruit* a 1-celled 2-valved 1 seeded capsule, .5-.7 by .3-.7 by .3-.4 in., ellipsoidal or ovoid, supported by the persistent calyx, somewhat verrucose outside. *Seed* stipitate, remaining on the tree even after the dehiscence of the capsule, bright red and beautifully veined outside; embryo straight; radicle inferior; cotyledons flat; albumen pearly-translucent, reddish.

Bhoreli Reserve-NORTH LAKHIMPUR; Barpathar and Garampani in SIBSAGAR; SYLHET, CACHAR and the KHASI HILLS up to 4500 ft.

Wood white, soft, weighing 30 lbs. per c. ft.

Flrs. & Fr. throughout the year, especially the cold season.

5. CELASTRUS Linn.

Shrubs, usually climbing anticlockwise. *Leaves* alternate, serrate; stipules 0 or minute and deciduous. *Flowers* small, polygamous, usually 5-merous, in axillary or terminal panicles or racemes. *Calyx* 5-cleft. *Petals* 5, spreading. *Disk* broad, concave. *Stamens* 5, inserted on the edge of the disk. *Ovary* free, 2-4 celled with 2 ovules in each cell; style short; stigma 3-lobed.

* In the genus a 3-4 angled 3-4 celled loculicidal capsule.

Fruit a globose or obovoid loculicidal capsule, 1-3-celled, 1-6 seeded. *Seeds* arillate, albumen fleshy; cotyledons leafy.

Branchlets lenticelled, terete :—

Flowers in large terminal panicles; style simple. ... 1. *C. paniculata*.

Flowers in axillary or terminal, short or racemose cymes; style 3-cleft. .. 2. *C. stylosa*.

Branchlets not lenticelled. Flowers in axillary and terminal narrow cyme-bearing panicles :—

Branchlets terete, style simple. .. 3. *C. venulosa*.

Branchlets quadrangular; style 3-cleft at top; capsule 1-celled, 1-seeded. ... 4. *C. monosperma*.

1. *Celastrus paniculata* Willd. Vern. *Pokitai*, Miri; *Samhaplau*, Kach.; *Malkagni*, Beng. & Hind.; *Mi-keroot*, *Mei-la-lih*, Khasi; *Tylle-soehlain*, Synt.

A large woody climber with corky bark; young shoots marked with lenticels. *Leaves* very variable in size and shape, generally 2-5 by 1-5-3 in., obovate, orbicular, elliptic or oblong-lanceolate, shortly acuminate, crenate or crenulate, more or less coriaceous, glabrous; base acute; lateral nerves 4-8 on either half, almost parallel to the margin; petiole 4-6 in. long. *Panicles* terminal, large, drooping, pubescent, branching into compound cymes; pedicels very short. *Flowers* 15 in. across, pale-green. *Calyx lobes* rounded, minutely toothed. *Petals* oblong. *Anthers* large, about as long as the petals, small and without pollen in female flowers. *Pistillode* in male flowers rudimentary. *Disk* larger in female flowers. *Style* simple. *Capsule* 4-6 in. across, globose, usually 3-celled, bright or orange yellow when ripe, marked outside with parallel horizontal wrinkles. *Seeds* 1-2 in each cell, enclosed in a red aril, albumen translucent, very oily; cotyledons-green.

Throughout ASSAM ascending to 2500 ft., in KHASI HILLS.

The seed yields an oil which has diuretic and diaphoretic properties and is believed to be a specific for Beri-beri. It can also be burnt in lamps. Powdered dry bark is applied on cuts for healing.

Flrs. 4-5. Fr. cold season.

Var. *venulosoides*—both the valleys in Assam with leaves almost as strongly reticulate as those of *C. venulosa*. The panicles are generally shorter and narrower but the seeds are somewhat larger than in the type.

2. *Celastrus stylosa* Wall. Vern. *Mei-jendru*, Khasi.

A woody climber resembling the last species; branchlets terete, brown or dark-brown, almost black, closely lenticellate. *Leaves* 2-5 by 1-2-8 in., elliptic, oblong-elliptic to lanceolate or obovate, shortly acuminate, often abruptly acute or cuspidate-serrate, midrib often red beneath in young leaves; lateral nerves 5-8 on either half, arcuate; petiole up to 1 in. long, often red. *Flowers* greenish-white, up to 2 in. across in axillary and terminal, puberulous, short or racemose cymes, much shorter than the leaves; pedicels capillary up to 1 in. long. *Calyx segments* green with thin white margins, oblong or ovate, minutely erose, with rounded or obtuse apex. *Petals* 2 in. long, oblong or spatulate, membran-

ous, with wavy hyaline margins; style elongate, 3-cleft. *Capsule* .25-.3 in. across, crowned by the remains of the style, yellow when ripe, transversely shrivelled in drying. *Seeds* about .2 in. long, enclosed in red aril, drying dark brown or almost black, perhaps less oily than of the preceding species.

Sarman-bheti in the Mikir Hill reserve-SIBSAGAR-probably also other parts of Mikir Hills, KHASI HILLS up to 5500 ft.

Flrs. 3-4. Fr. 10-12.

3. *Celastrus venulosa* Wall.

A large woody climber which when cut exudes copious clear potable water, branchlets not lenticelled. *Leaves* 3-6 by 1.5-2.5 in., elliptic-oblong or obovate, abruptly and shortly acuminate, cuspidate-serrulate, chartaceous, shining on both surfaces; turning yellow before falling; lateral nerves 7-8 on either half, arched, prominent beneath, tertiaries transverse, closely and conspicuously reticulate; base acute or cuneate; petiole .3-5 in. long, channelled. *Flowers* white, articulate with the short pedicels and soon breaking off from them, generally in long narrow-cyme-bearing terminal panicles, sometimes in shorter axillary ones. *Calyx-segments* rounded, somewhat laciniate. *Petals* 5, about .15 in. long and almost as broad, on large cup-shaped disk. *Stamens* 5; style not lobed. *Capsule* not seen.

Charduar Reserve in DARRANG, SYLHET, Wallichi.

Flrs. 1-2. Fr. 3-4 (?).

4. *Celastrus monosperma* Roxb. Vern. *Gelomtaru*, Duff., *Bhumlati*, Ass.

A large glabrous woody climber, branchlets quadrangular, not lenticelled, hollow. *Leaves* 2-5 by 1.2-2.7 in., elliptic, oblong or obovate, abruptly and bluntly short acuminate, cuspidate serrate or serrulate, chartaceous, dark green and shining above, pinkish beneath; lateral nerves 5-7 on either half, much arched, tertiaries slender, sub-scalariform; base subacute to almost rounded; petiole .2-3 in. long. *Flowers* whitish, .15 in. across, in peduncled cymes, often arranged on elongated terminal and axillary panicles up to 7 in. long, rachis quadrangular; buds globose; pedicels about .1 in. long, bracteoles minute, persistent. *Calyx lobes* orbicular in bud, slightly elongated in open flowers, usually minutely erose. *Petals* .1 in. long, broadly oblong or obovate-oblong. *Anthers* very broad, purplish-brown, dotted. *Style* 3-lobed at the apex, gradually narrowed upwards from the ovary. *Capsule* about .5 in. long, 3-valved 1-seeded. *Seed* about .3 in., ellipsoid.

Dulong Reserve-LAKHIMPUR; NAGA HILLS; probably also in SYLHET, KHASI HILLS and KAMRUP.

Flrs. 3-4. Fr. 10?

Celastrus Championii Benth. A large woody climber. *Branchlets* terete, lenticelled, hollow. *Leaves* 5.5-6.5 by 1.2-3 in., obovate-elliptic, oblong or oblong lanceolate, bluntly short acuminate, chartaceous or coriaceous, somewhat distantly cuspidate serrulate; lateral nerves 5-7 on either

half, tertiaries sub-scalariform; petiole '3-5 in. long, grooved. *Cymes* peduncled, sometimes racemose, often somewhat distantly arranged on axillary terminal panicles. *Flowers* '15-2 in. across; pedicels '1 in. long, bracteoles persistent. *Calyx-lobes* orbicular, minutely laciniate. *Petals* broadly oblong, anthers broad, purplish-brown, dotted; style 3-grooved at the apex, distinct. *Capsule* '6-8 in. obovoid, 5-valved 1-seeded. *Seed* '5 by '3 in., ellipsoid, enveloped in bright orange-yellow aril which is mealy astringent and sweetish; albumen fleshy.

Umta sail; Mynso road—Khasi Hills, 3500-5500 ft., Naga Hills, Sylhet-Brandis.

Closely allied to *C. monosperma* of which it may be regarded as a robust form.

***Celastrus membranifolia* Prain.**—A shrub, leaves membranous, ovate lanceolate, serrate; petiole '6 in. long.

Khasi Hills. I have seen no specimens.

6. KURRIMIA Wall.

***Kurrimia pulcherrima* Wall.** Vern. *Hinguri*, Ass. (Nowg.); *Tumser*, Mik.; *Mahhang*, Kuki; *Dieng-mat-wee*, *Dieng-soh-ngang*, Khasi.

A large glabrous evergreen tree, up to 90 ft. in height and 5 ft. in girth with an oval crown and spreading branches; trunk much fluted and buttressed at the base when old. *Bark* dark greyish-brown outside, somewhat rough and of a darker colour with age, light greenish-brown and mottled with minute dots inside. *Leaves* alternate, bifarious, very variable in size and shape, 3-10 by 1-3.5 in., elliptic to oblong lanceolate, shortly acuminate, quite entire, chartaceous or coriaceous, quite glabrous, shining above, red when very young; lateral nerves 10-16, on either side of the midrib, arched, very slender, raised on the lower surface, tertiaries extremely fine, about '01 in. apart, parallel and transverse to the midrib; base more or less rounded; petiole slender, '5-1 in. long, swollen below the base of the blade, finely channelled above; stipules lanceolate, convolute. *Flowers* white, about '15 in. across, shortly pedicelled, in axillary, solitary or paired, simple, rarely compound racemes, 3-5 in. long. *Calyx* 5-fid; segments recurved, subsistent. *Petals* 5, about '1 in. long, oblong, recurved, inserted on (?) the margin of the cup-shaped fleshy 5-lobed puberulous disk. *Ovary* crowned at the top with a tuft of hairs; styles 2, filiform; ovules 2 in each cell, erect. *Fruit* a 2-valved 1-celled capsule, generally 1-seeded, lanceolate in outline, '8-1.5 by '3-5 in. *Seed* erect; aril fleshy, yellow, complete except for a small terminal aperture; albumen fleshy, white.

Fairly common, though not abundant throughout the PROVINCE.

Wood coarse grained, reddish-brown with close concentric lines of soft tissue and close and regular medullary rays thus presenting appearance of coarse cloth on a transverse section. Weight varies between 44 and 48 lbs. per c. ft. It is said to be brittle.

Fls. 9-10. Fr. 1-3.

7. GYMNOSPORA W. & A.

Shrubs or small trees often armed. *Leaves* alternate, usually serrate, stipulate or exstipulate. *Flowers* 2-sexual, small, greenish or yellowish in axillary or subaxillary often clustered dichotomous cymes; cymes often much contracted. *Calyx* 4-5 fid or 4-5 partite. *Petals* 4-5, spreading. *Stamens* 4-5, inserted usually below the disk. *Disk* broad, sinuate or lobed. *Ovary* confluent at the base with the disk or more or less sunk in it, 2-3 celled, with short style and 2-3 stigmas; ovules 2 in each cell. *Capsule* usually obovoid, rarely globose, 3-gonous, 2-3 celled, 1-4 seeded; seeds aluminous, aril partially or entirely covering the seeds or rarely 0.

Armed; spines not bearing leaves, inflorescence usually reddish.

.. 1. *G. rufa*.

Unarmed; inflorescence yellowish green.

.. 2. *G. acuminata*.

***Gymnosporia rufa* Laws.**

An erect shrub or small trees often armed with simple axillary spines up to .4 in. long, all parts glabrous or the branchlets glaucous. *Bark* dark grey or brown, rough, often recticulately fissured; blaze red with fine white lines. *Leaves* 2-5 by .5-1.5 in., oblong-lanceolate to elliptic-lanceolate, bluntly rarely sharp acuminate, crenate serrate, thinly coriaceous; lateral nerves 7-10 on either half; base narrowed; petiole .1-3 in. long, reddish, slightly margined towards the top; stipules deciduous, up to .1 in. long, subulate, margins setose. *Flowers* about .1 in. across, greenish white. *Cymes* axillary or below the leaves; peduncles up to .8 in. long; reddish, filiform; pedicels very slender. .1 in. long; bracts and bracteoles very small. *Calyx* teeth 5, triangular; petals 5, sub-orbicular. *Capsule* .3 in. across; 2-3 valved, opening along the upper portions of valves and septa, aril covering nearly the whole seed when mature.

KHASI HILLS ascending to about 4000 ft.

Firs. 4. Fr. 5-6.

2. *Gymnosporia acuminata* Hk. f. Vern. *Dieng-chandre*, Kh.

A small unarmed tree attaining 30 ft. *Bark* brown to almost blackish, rough, warty; blaze red with vertical white lines. *Leaves* usually 2-5 by 1-2 in. (according to F. B. I. 5-8 by 2-3.3 in.) lanceolate, elliptic-lanceolate or oblanceolate, short acuminate, serrate, thin; lateral nerves 7-9 on either half; base cuneate; petiole .2-2.5 in. long, channelled. *Flowers* small in yellowish dichasial peduncled cymes; peduncles yellowish green, very slender, fascicled on axillary tubercles, .5-1 in. long; pedicels up to .1 in. long. *Calyx* lobes triangular ovate, minutely erose. *Petals* a little longer. *Capsules* .3 in. long, mostly 2-celled, compressed, lower half covered with lacerate aril.

KHASI HILLS 2500-4600 ft. Nangkhlaw, Syndai.

Firs. 4. Fr. 6?

G. salicifolia Lawson. A shrub (?). *Leaves* 3-5 by 1-4.5 in., narrowly lanceolate, serrate, glabrous; lateral nerves faint, 12-15 on either side; petiole .2 in. long. *Cymes* paniced, axillary, branches of panicles filiform. *Flowers* .15 in. across. *Capsule* not seen.

A solitary specimen in Calcutta Herbarium "Digunaddi—GARO HILLS" collected about 1850.

Frs. 3-5.

Imperfectly known species:—

G. neglecta Wall. Cat. A shrub? with stout branches. *Leaves* 4-6 by 2-2.5 in., ovate-elliptic, acute or subacuminate, entire or very faintly serrate towards the apex, coriaceous, glabrous. *Flowers* small in very slender dichotomous cymes. *Fruit* nearly globose about .25 in. across, 3-celled, 1-3 seeded—*F. B. I.*

SYLHET—Wallich.

FAM. 40. HIPPOCRATEACEÆ.

Small trees or erect or climbing shrubs. *Leaves* opposite or alternate, simple, often coriaceous. *Flowers* usually very small in axillary dichotomous cymes or clustered, often on tubercles. *Calyx* 5 lobed, lobes imbricate. *Petals* 5, inserted below the disk. *Disk* fleshy, cup-shaped. *Stamens* usually 3, inserted on the inner side of the disk, at first erect, then recurved; filaments dilated. *Ovary* more or less sunk in the disk, 3-celled; style 1; stigmas usually 3 lobed; ovules 2 or more in each cell, on an axile placenta. *Fruit* of samaroid carpels or baccate and 1-3 celled. *Seeds* usually many, often angular, sometimes winged; albumen 0; cotyledons large.

Fruiting carpels samaroid, dehiscent, seeds winged.
Fruit globose, baccate, seeds not winged.

.. 1. *Hippocratea*.
.. 2. *Salacia*.

1. HIPPOCRATEA Korth.

Climbing glabrous shrub (Assam species); branches opposite, often coiled. *Leaves* opposite, usually 2-farious, serrate or crenate; stipules small, caducous. *Flowers* small, sometimes minute, bracteate, in axillary umbelliform cymes or in axillary and terminal paniced cymes. *Calyx* small, 5-partite. *Petals* 5, thick, imbricate or valvate. *Stamens* 3, ultimately recurved. *Ovary* 3 celled; style very short or 0; ovules in 2 series, 2-10 in each cell. *Fruit* samaroid with 1-3 wing-like flattened carpels which dehisce in a straight slit along their centre. *Seeds* compressed, winged, the wing being pointed towards the base of the fruit; albumen 0; cotyledons large, connate.

- I. Flowers minute not exceeding .05 in. in diam., mostly in axillary umbelliform cymes; valves of samara coriaceous, striated; wing of seed oblong, greenish-brown:—
 - Leaves narrowly elliptic or lanceolate, membranous. .. 1. *H. indica*.
 - Leaves ovate or broadly elliptic, chartaceous or thinly coriaceous. ... 2. *H. arborea*.
- II. Flowers up to .2 in. in diam., mostly in terminal paniced cymes; valves of samaras woody, scarcely striated; wing of seed ovate-elliptic, red:—
 - Leaves broadly elliptic, very coriaceous, entire or nearly o. ... 3. *H. macrantha*.

1. *Hippocratea indica* Roxb. Vern. *Atari-lata*, Beng. (Cach); *Sibrai-ia-dam*, Cach., *Phirke-lera*, Nep.; *Bom-pel-thing*, Kuki.

A bushy shrub with sarmentose branches which climb by means of coiled branchlets. *Leaves* very variable in size and shape, drying green, 2-7 by 1.2-3.5 in., ovate, elliptic oblong or lanceolate, finely acuminate, serrate with deciduous cusps, membranous, more or less shining; lateral nerves 4-6 on either half, slender, much arched, raised on both surfaces; base cuneate, often slightly oblique; petiole .5-.8 in. long, deeply channelled. *Inflorescence* axillary, 5-chotomously branched. *Flowers* very small, rusty yellow, sweet scented in axillary and terminal repeatedly trichotomous or dichasial compound pedunculate cymes, bracteate at the joints and also at the base of the pedicels, ultimate branches umbel-like; bracts subsistent, acuminate, lacinate or ciliate; buds globose. *Calyx* segments triangular or ovate, ciliate. *Petals* usually 6, elliptic-oblong, concave. *Mature carpels* 2-3.5 by .7-1 in., oblong, usually 2-seeded; valves leathery, longitudinally striated outside; seed about .5 in. long, wing 1.5-2 by .5-.6 in., oblong, sub-chartaceous, with a strong dorsal and a median nerve, glabrous.

South-Western parts of the SIBSAGAR DISTRICT from Barpathar to Dimapur; GOALPARA, N. C. HILLS, SYLHET and CACHAR.

Wood white, tough and compact. The Nepalese use the switchy branches with portions of the branchlets for spinning strands in making ropes.

Firs. 5-6. Fr. 10-12.

The plant is often affected by Fulgorid bugs.

2. *Hippocratea arborea* Roxb.

A tall climber apparently never bushy, climbing by means of hooked branches and spreading itself on crowns of tall trees. *Leaves* generally much larger than those of the preceding species, 4-7 by 2-3.5 in., ovate, obovate or elliptic, acute or bluntly acuminate, cuspidate-serrate, with deciduous black or brown tips, chartaceous; lateral nerves 5-7 on either side of the midrib, slender, much arched; base cuneate; petiole .6-.8 in. long, stout, channelled. *Inflorescence* and flowers* as of the preceding species. *Mature carpels* 3-4.5 by 1 in., oblong with cuneate base, generally 2-seeded; valves leathery, longitudinally striated outside, smooth

* The flower is sometimes attacked by a gall-insect which transforms the fruit into fleshy globose bodies about .25 in. across.

inside ; seed about 1 by .4 in. ; wing 2 by .75 in., scarcely veined with a thick corky back ; median nerve very faint or obsolete.

Barpathar, Merapany also the Mikir Hills in SIBSAGAR and KAMRUP.
Fls. 5-6. Fr. 12-1.

As pointed out by Lawson in Flora of British India, this should be properly regarded as a variety of the last species from which it differs in but little except its more robust size.

3. *Hippocratea macrantha* Korth.

A very large woody climber which climbs to the top of tall trees and spreads itself on their crowns ; bark grey outside, reddish inside. *Leaves* 4-7 by 2-3 in., generally elliptic, often oblong or obovate, rounded or bluntly short acuminate, minutely cuspidate, crenate or subentire, thickly coriaceous, dark-green, shining on both surfaces ; lateral nerves generally 6 on either side of the midrib, arched, raised and conspicuous on the undersurface ; base usually cuneate ; petiole .5-.7 in. long, stout, margined. *Inflorescence* a cyme-bearing panicle, 3-5 in. long, axillary as well as terminal, the latter often terminating in a pair of small thin leaves. *Flowers* white or pale-yellow, about .16-.2 in. across. *Calyx lobes* 5, ovate or deltoid with thin reddish margins. *Petals* 5, apparently dimorphic in some flowers (males ?), strap-shaped with convolute margins, in others (females ?) ovate, much shorter, broadly imbricate, the latter on shorter and stouter pedicels. *Mature carpels* 3-5 in. by 1-1.3 in., flat, woody, reddish inside, generally 4-seeded. *Seeds* .6-.7 by .2-.3 in. ; wing 2.2-5 by .6-.7 in., reddish, very thin, shining with a thin, dorsal and slender but distinct median nerve.

Mikir Hills in SIBSAGAR and Charduar in DARRANG. Distribution KAMRUP.

Fls. 11-12. Fr. January onward.

2. SALACIA Linn.

Sarmentose shrubs, sometimes small trees. *Leaves* opposite, exstipulate. *Flowers* small, solitary, few or many, generally in axillary clusters. *Calyx* small, 5-partite. *Petals* 5, imbricate in bud. *Disk* thick, broad or conical. *Stamens* usually 3 ; filaments recurved ; anthers small, sometimes dehiscing transversely. *Ovary* immersed in the disk, 3-celled ; style very short ; ovules 2-8 in each cell, generally in 2 series. *Fruit* a berry, fleshy or leathery. *Seeds* usually angular, not winged ; albumen 0 ; cotyledons corrugated.

Berry smooth, not exceeding .5 in. in diam., 1-celled on a slender pedicel, .5 in. long.

.. 1. *S. prinoides*.

Berry wrinkled, 1.5-2 in. diam., 2-3 celled, subsessile.

.. 2. *S. Roxburghii*.

1. *Salacia prinoides* DC.

A semi-scandent woody shrub ; branches very smooth, more or less 4-cornered ; bark white inside. *Leaves* 1.5-3 by .7-1.2 in.,

oblong elliptic or lanceolate, bluntly acuminate, crenate, coriaceous, dark-green and shining above, pale beneath; main lateral nerves 5-6 on either side of the midrib, faint; base cuneate petiole 2-3 in. long, slender, margined. *Flowers* about 2 in. across, pale-green or yellowish, with an offensive smell, usually fasciated on axillary tubercles; pedicels 2-3 in. long, slender. *Sepals* small, puberulous, ciliate. *Petals* clawed, about 1 in. long, broadly obovate, entire but with a wavy margin. *Disk* cup-shaped, fleshy, persistent and accrescent in fruit. *Stamens* on the inner margin of the disk; filaments slender, terete, but with an abruptly dilated broad base. *Ovary* 3-celled. *Berry* 1-celled, 1-seeded, 3-5 in. across, globose, minutely rugose outside, red when ripe; seed conforming, not angular, surrounded by a white sweet pulp.

Barpathar and Kamargaon in SIBSAGAR, generally in scrub forest, KAMRUP.

Figs. 1-3. Fr. 2-4.

2. *Salacia Roxburghii* Wall. Vern. *Ain-kimbel*, Abor; *Sibraietam*, Kach.

A large woody climber; branchlets more or less angular; bark dark-grey, rough; inside white with brown streaks, fibrous. *Leaves* 3-5 by 1-2 in., elliptic-oblong or oblong lanceolate, caudate-acuminate, entire or nearly so, coriaceous, glabrous, dark-green and shining above; lateral nerves 6-8 on either side of the midrib, arched; base acute or subacute; petiole 2-3 in. long, margined, rather thick. *Flowers* greenish, about 1.5 in. across, in fascicles of 3-6 from axillary bracteate tubercles; pedicels slender, 3-6 in. long. *Sepals* small, orbicular, subciliate. *Petals* suborbicular, about 1 in. long, not clawed. *Filaments* short, dilated; anthers transverse. *Berry* deep pinkish red, 1.5-2 in. across, globose, 2-3 celled with one seed in each cell; rind thick and leathery; pulp red, gelatinous, edible.

Fairly common in evergreen forests throughout UPPER ASSAM, e.g. Nizamghat and Pasighat, NORTH EAST FRONTIER DISTRICT; Sola, Deroi and Nambor Reserves in SIBSAGAR; Bahali in DARRANG.

Wood yellowish. The ripe fruit is eaten.

Figs. 12-5. Fr. 7-10.

Salacia membranacea Laws.—*Leaves* 3-5 by 1-3 in., ovate elliptic or lanceolate, more or less caudate-acuminate, membranous or thinly coriaceous, entire; main lateral nerves about 8 on either half; base abruptly cuneate; petiole 3-3.5 in. long, channelled. *Flowers* small in axillary fascicles. *Fruit* globose, (?) about 3 in. across (?).

ASSAM—Jamuna falls—Jenkins!

According to Gamble only a form of *S. Roxburghii*.

Figs. 2-3.

Salacia floribunda Wight.—A scandent shrub. *Leaves* 3-6 by 1-2 in., elliptic or oblong shortly and obtusely acuminate, sharply serrate, coriaceous, glabrous, dark-green, shining above; lateral nerves 9-12 on either half, slender, arched; petiole 3-5 in. long, channelled. *Cymes* peduncled, usually axillary, often with supra-axillary pair. *Berry* globose, about .9 in. across (sometimes up to 2 in. long.—Mann's sheet in Sibpur herbarium) with irregular ridges.

ASSAM and KHASI HILLS—Griffith, SYLHET—De Silva.

FAM. 41. RHAMNACEÆ.

Trees or shrubs, often armed, sometimes climbing, rarely cirrhose. *Leaves* simple, generally alternate, rarely opposite, often with strong basal nerves; stipules small, deciduous or changed into prickles and persistent. *Flowers* hermaphrodite or polygamous, regular, small, greenish, usually in axillary simple or panicle cymes. *Calyx* 4-5 cleft, generally inferior; segments valvate, triangular, often with a median ridge within. *Petals* 4-5, rarely 0, inserted on the calyx tube, usually clawed, and hooded, *Stamens* 4-5, opposite to the petals and often enclosed within their folds; filaments usually filiform; anthers versatile. *Disk* fleshy or thin, usually glabrous. *Ovary* free or more or less immersed in the disk or calyx-tube, usually 3-celled with one erect ovule in each cell; styles united, short. *Fruit* various, generally indehiscent, 1-4 seeded. *Seed* with copious albumen, rarely exalbuminous; embryo large, erect.

- I. Ovary superior or half superior :—
 - A. Fruit dry, winged or compressed at the apex like a wing :—
 - Unarmed climber; fruit indehiscent with a long terminal wing. .. 1. Ventilago.
 - Unarmed climber, fruit capsular, compressed like a wing above the seed. .. 2. Smythea.
 - B. Fruit not dry, not winged :—
 - a. Leaves more or less oblique, 3-5 nerved at the base; disk thick, lining the calyx-tube :—
 - Erect or scrambling shrubs, armed with stipular prickles; peduncle not thickened in fruit, fruit with solitary stone. .. 3. Zizyphus.
 - Unarmed tree, peduncle thickened in fruit, fruit with 3 pyrenes. .. 4. Hovenia.
 - b. Leaves symmetrical without basal nerves, disk thick, lining the calyx-tube :—
 - Leaves alternate, nerves prominent, parallel; stone solitary, 2-celled, 3-seeded. .. 5. Berchemia.
 - Leaves opposite or subopposite, nerves not parallel, fruit with 3 1 seeded pyrenes; straggling shrubs. .. 6. Sageretia.
 - c. Leaves symmetrical, disk thin, lining the calyx tube, spinescent or unarmed erect shrubs, fruit with 2-4 pyrenes. .. 7. Rhamnus.
- II. Ovary inferior, Shrubs climbing by tendrils. Leaves symmetrical alternate, fruit a 3-winged capsule. .. 8. Gouania.

1. VENTILAGO Gærtn.

Unarmed scandent shrubs; stem generally blackish, occasionally with some of the branchlets coiled round the supports. *Leaves*

alternate, bifarious; stipules small, caducous. *Flowers* small, 2-sexual, bracteate, in axillary and terminal panicles. Calyx 5 fid, lobes spreading, keeled within. *Petals* 5, deltoid, hooded, spreading. *Stamens* 5, adnate to the base of the petals; connective produced. *Disk* 5-lobed, filling the calyx-tube, *Ovary* 2-celled, globose, sunk in the disk; style very short, bifid; ovule one in each cell. *Fruit* a 1-celled 1-seeded nut seated on or partly enclosed by the persistent and adherent calyx tube and prolonged above into a linear-oblong coriaceous wing with a prominent midrib and crowned by the remains of the stigma; seed subglobose, exalbuminous.

Leaves usually acuminate, glabrescent, with generally 6-8 secondary nerves; nut girt by the calyx-tube below the middle, wing glabrous. ... 1. *V. maderaspatana*.
Leaves obtuse, velvety-pubescent with 4-5 secondary nerves; nut girt by the calyx-tube round the middle, wing usually yellow-pubescent. ... 2. *V. calyculata*.

1. *Ventilago maderaspatana* Gaertn. Vern. *Riko-riubi*. Miri & Abor; *Bor-kalia*, Ass.; *Sher-kharuang*, Khasi (Bhoy).

A large woody climber with long sarmentose branches; bark dark-grey, furrowed, red in the furrows, branchlets glabrescent. *Leaves* bifarious, 2.5-4 by 1.1-1.5 in., elliptic or oblong-lanceolate, crenate or crenate-serrate or nearly entire, thinly coriaceous, glabrous or glabrescent, turning yellow before falling; lateral nerves 5-8 on either side of the midrib, slender, much arched; tertiary nerves transverse to the midrib, very fine, close and parallel; base more or less acute, subsymmetrical; petiole 1.5-2 in. long, channelled; stipules small, subulate. *Flowers* small, fascicled in groups on large leafy pubescent panicles. *Calyx* puberulous outside, glabrous within, lobes keeled within with an incurved pointed apex. *Petals* spatulate, shorter than the calyx-lobes, enveloping the stamens. *Disk* glabrous or thinly pubescent. *Ovary* hairy at the base. *Nut* globose, about .2 in. across, girt by the calyx-tube below the middle; wing 2.2-2.5 by .3-4 in., oblong, thin, glabrous and shining, finely veined.

Low-lying places in UPPER ASSAM, e. g. the Majuli in SIBSAGAR, Gotonga in NOWGONG.

The bark of the stem gives good cordage fibre (Haines), and the root bark a dye (Gamble).

Flrs. 9-12. Fr. 12-4.

2. *Ventilago calyculata* Tulasne. Vern. *Ancham-chamkai*, Kuki; *Mei-bynoh*, Khasi (Syl. border); also generally the names given to the foregoing species.

A very large woody climber; branchlets grey-velvety, finely ribbed; bark black, furrowed. *Leaves* 2-farious, variable, 2.5 by 1.25-2 in., elliptic ovate or oblong, bluntly short acuminate or obtuse, cuspidate-serrate, chartaceous, dark-green, glabrous and shining above, more or less velvety pubescent beneath along the midrib and nerves, yellow before falling; lateral nerves 4-6 on either half, slender, much arched, tertiaries transverse, very close

and parallel; base unequally rounded and somewhat unsymmetrical; petiole 1-2 in. long, terete or imperceptibly channelled, hairy. *Flowers* small with a somewhat offensive smell, greenish-tomentose, very numerous in large dense terminal leaf-bearing grey velvety panicles. *Calyx* pubescent. *Petals* 5, tomentose, deflexed. *Disk* villous. *Nut* 2 in. across, globose, yellow or brown-pubescent, girt about the middle by the rim of the adherent calyx-tube; wing 2-2.5 by 3-4 in., strap-shaped, more or less pubescent with a strong straight midrib and 4-6 less prominent shorter veins parallel to the midrib.

Usually treated as a variety of the last species and more common than it generally in deciduous forests throughout the province up to about 1500 ft. in the hills.

Flrs. 12-1. Fr. 3-5.

2. SMYTHEA Seem.

Smythea calpicarpa Kurz. Vern. *Mei-ryn-nao*, Khasi.

A large woody evergreen climber; branches green with continuous vertical lines of grey lenticels alternating with obscure flutings; branchlets rusty tomentose, often cirriform. *Leaves* 2-farious, of two sizes,—ordinary 2-4.5 by 6-1.5 in., lanceolate, oblong or ovate-lanceolate, acuminate, often caudate, crenate serrate, serratures usually cuspidate, membranous but tough, dark-green and almost concolor on both surfaces, shining above, glabrous with age but usually with tufts of hairs on the axils of lateral nerves; lateral nerves generally 6-7 on the outer half and 5-6 on the inner, prominent beneath, converging upwards, tertiaries very close, transverse and parallel; base unsymmetrical, rounded on the inner half, subacute on the outer; petiole 1.5-2 in. long, terete. *Flowers* not seen, in fascicles or solitary? from the axils of reduced leaves (bracts?) at the ends of branches which are 6-1.5 by 2-5 in.; pedicels about 2 in. in fruit. *Calyx* 5-lobed, tube obconic, persistent. *Disk* filling the calyx-tube. *Stamens* 5, free; anthers didymous. *Ovary* immersed in the disk, 2-celled. *Capsule* 1-celled, 1-seeded, adnate at base to the calyx-tube, compressed above the seed, altogether 2-3 in. by 4-5 in., the compressed part oblong, minutely puberulous or glabrescent with a strong straight midrib, terminated by the remains of the style, and with 10-12 fine straight veins, parallel to the midrib; basal portion brown pubescent.

Southern slopes of the KHASI HILLS west of Shella up to 1200 ft.

Closely resembling *Ventilago* in foliage and habit.

Flrs. rains? Fr. 12-1.

3. ZIZYPHUS Juss.

Trees or shrubs, sometimes sarmentose, usually armed with stipulary prickles. *Leaves* alternate, more or less 2-farious, usually coriaceous, palmately 3-5 nerved at the base. *Flowers* small, in

fascicles or in sessile or peduncled, sometimes paniced cymes. *Calyx* 5-fid; lobes spreading, keeled within. *Petals* 5, cucullate, deflexed, rarely 0. *Disk* 5-10 lobed, coating the calyx-tube; edges free. *Stamens* 5, often nestling under the hooded petals. *Ovary* 2-4 celled, sunk in the disk and often adnate to it at the base; styles 2-4, free or partially connate. *Fruit* a fleshy or dry drupe with a hard 1-4 celled and 1-4 seeded stone. *Seeds* somewhat compressed; cotyledons thick.

- I. Flowers fascicled or in sessile cymes. Leaves hairy beneath :-
 - A tree or erect shrub; drupe orange or red when ripe. .. 1. *Z. Jujuba*.
 - A scrambling shrub, drupe black when ripe. .. 2. *Z. Encoplia*.
- II. Flowers in peduncled simple groups of cymes. Leaves glabrous or nearly so :-
 - A tree. Calyx glabrous within. Petals 5. .. 3. *Z. incurva*.
 - A shrub. Calyx hairy inside. Petals 0. .. 4. *Z. apetala*.
- III. Flowers in peduncled cymes disposed in large panicles :-
 - A tree. Leaves felted beneath. Calyx puberulous within. Petals 0. Fruit terete. .. 5. *Z. rugosa* (type).
 - A scrambling shrub. Leaves not felted beneath; petals 0. .. *Z. rugosa* (Var. *glabrescens*).
 - A scrambling shrub. Leaves glabrous. Calyx glabrous within. Petals 5. Fruit compressed. .. 6. *Z. funiculosa*.

1. *Ziziphus Jujuba* Lamk. Sans. *Badari*. Vern. *Boguri*, Ass. & Miri; *Gange-asing*, Abor; *Thakri-arong*, Mik.; *Boroi*, Beng. (Cach. & Sylh.) also Kuki; *Thai-ganggi*, Kach.; *Theng-khi*, Garo; *Dieng-soh-broi*, Khasi.

A small tree usually up to 30 ft., in height and 4 or 5 ft. in girth, almost evergreen; bark dark-grey or on old stems nearly black with long vertical cracks, reddish and fibrous inside; young parts rusty tomentose. *Leaves* very variable, 1-3 by 6-2.5 in., obliquely elliptic-ovate or suborbicular, closely serrulate or entire, dark-green, glabrous and often shining above; densely rusty or grey-tomentose beneath, strongly three-nerved, nerves closely penniveined; base obliquely rounded; petiole 1-6 in. long; prickles solitary or in pairs, straight or one of a pair recurved. *Cymes* 5-7 in. across., axillary, nearly sessile. *Flowers* small, greenish yellow. *Calyx* glabrous within. *Petals* narrow, concave, reflexed, clawed. *Disk* 10-lobed. *Ovary* 2-celled; styles 2, united to the middle. *Drupe* 5-1 in. long, globose or ellipsoidal or obovoid-acuminate, with a fleshy, mealy aromatic acid or subacid pulp, red or orange when ripe; stone 2-celled, tubercled.

Fairly common throughout the plains and up to 2000 ft. in the GARO, KHASI and N. CACHAR HILLS, especially in a degraded form in which it is reduced to bushes.*

* The bushy form may be Var. *fruticosa* Haines. This is a shrub about 4 ft. high. *Leaves* ovate-suborbicular, stipular prickles in pairs both strong. *Fruit* globose, 3 in. across. This form never grows to a tree and often forms gregarious patches in grass lands. Further study in the field is necessary to definitely ascertain this.

Wood hard, compact, tough, reddish, weighing 45-52 lbs. per c.ft. Excellent for fuel and charcoal. Lac can be grown on the branches. The leaves are a good fodder for cattle and goats. The fruit is eaten and the bark is said to be useful for diarrhoea.

Flrs. 9-11. Fr. 12-2.

2. Zizyphus Cnoplia Mill. Vern. *Ingsu-dampo*, *Ingsu-damphu*, *Ingsu-rikang*, *Sudomphu*, Mik.; *Anor*, Beng. (Sylh.); *Sumugujum*, *Thaigangi-jola*, *Thai-gangdi-hagra-biding-doukha*, Cach.; *Ral-ling-rang*, Kuki; *Ling-kemrang*, Tipp.

A bushy thorny shrub with long sarmentose branches; bark rough, dark-grey; branchlets 2-farious, somewhat zigzag. *Leaves* 2-farious, 1-2.5 by .7-1.4 in., ovate-lanceolate, acuminate, obscurely crenate serrate or subentire, nearly glabrous but somewhat harsh above, pale and softly brown pillose beneath, specially along the nerves, 3 sometimes 4 nerved from the base converging to very nearly the apex, side nerves inclined to the main nerves, subparallel; base slightly oblique; petiole .1-3 in. long, pubescent; prickles solitary and recurved or in pairs when one is often pointed upward; on old stems often developing a broad pyramidal woody base. *Cymes* axillary, small; flowers pedicelled. *Calyx* about .1 in. long, tomentose outside, glabrous within; lobes keeled, broad ovate. *Petals* greenish-yellow, obtriangular, hooded, shorter than the calyx. *Disk* glabrous, 10-lobed. *Stamens* shorter than the petals and embraced by them. *Ovary* glabrous, 2-celled. *Drupe* .25 in. long, obovoid-globose, black when fully ripe; stone usually 1, rarely 2-celled, tubercled.

Fairly common in scrubby forests throughout the plains of both valleys and up to 2,000 ft. in the hills. Not reported from the LAKHIMPUR and N. E. FRONTIER DISTRICTS.

The roots are used medicinally, and the ripe fruit is edible.

Flrs. 9-10. Fr. 11-1.

3. Zizyphus incurva Roxb. Vern. *Dieng-chi-soh-Steing*, Khasi.

Usually a small tree but occasionally up to 80 ft. in height and 7 ft. in girth; bark grey or blackish, studded with horizontal lines of spines on raised woody pyramidal bases, brownish inside; young parts adpressed pubescent. *Leaves* 2-farious, 2-4 by 1-1.5 in., ovate-oblong, acuminate, serrulate or closely serrate, coriaceous, glabrous above, sparsely pilose along the main nerves beneath, unsymmetrically strongly 3-nerved from the base; lateral nerves often forked near the base, side nerves slender, arched; base oblique; petiole .3-6 in. long, strigose, stipulary prickles 0 on large plants, solitary or in pairs on young plants, one being straight and the other incurved. *Cymes* about 1 in. long, peduncled, pubescent. *Calyx* hairy outside, glabrous within. *Petals* 5, slightly hooded. *Disk* 10-lobed with a pit at base of each lobe. *Ovary* 2-celled; styles 2, connate up to the middle. *Fruit* .4 by .3 in., ellipsoid, woody; stone usually unequally 2-celled.

KHASI HILLS not widely spread, common at Nongstoin 5600 ft., where it grows to be a fairly large tree.

Wood brownish, fine-grained, weighing 40 lbs. per c. ft.; pores evenly scattered, medullary rays very fine, capable of being used for turning.
Flrs. 5-6. Fr. 9-10.

4. *Zizyphus apetala* Hk. f. Vern. *Bon-boguri*, Ass.

A straggling shrub with rusty-tomentose switchy branchlets; bark blackish-grey with vertical lines of lenticels, 3 in. thick, peeling off when old exposing a reddish-green surface, red inside. *Leaves* 2.5-4 by 1.5-2 in., ovate-lanceolate, caudate-acuminate, sharply serrulate, thinly coriaceous, glabrous above, rusty-silky pilose along the main nerves beneath. 3-nerved from the rounded unsymmetrical base; side-nerves arched; petiole 3-5 in. long, finely channelled, sparsely hairy; stipulary prickles solitary, recurved, rusty-tomentose. *Cymes* 1-1.5 in. long; peduncles and ramifications densely rusty-tomentose. *Flowers* about .25 in. across. *Calyx*-lobes 5, about .1 in. long, ovate, densely hairy outside, minutely hairy within, faintly keeled. *Petals* 0. *Stamens* as long as the calyx-lobes; filaments glabrous. *Disk* 10-lobed, glabrous along the margin. *Ovary* 2-celled, conical, hairy; styles 2, united to above the middle, rarely (by abortion?) solitary. *Fruit* 1-celled, (immature) .5 in. long and broad, .25 in. thick, compressed, glabrous.

From Dirju in NORTH LAKHIMPUR to Pabhoi in DARRANG, not common.

Wood white. The ripe fruit is said to be eaten.

Flrs. 3-4. Fr. 4-6.

5. *Zizyphus rugosa* Lamk. Vern. *Bon-boguri* Ass. (Nowg.); *Dhidhao-boguri* Ass. (Darr.); *Bata-bakuri-arong* Mik.; *Tauling-asikur*, *Thai-gangni-hagra*-(gedeba), Cach.; *Khusuguchhi*, Aka; *Aker-tarug*, Duff.; *Wokner*, Kuki; *Khankhri-wakbuk*, *Thengkhi-makbil*, *Khongkhanimakbul*, *Dumakpul*, Garo; *Bhot-boguri*, Jharua; *Sumusram*, *Garo-sal*, Mech; *Bon-boroi*, Sylh.

A small armed deciduous tree with long straggling branches; young parts generally rusty-tomentose; bark dark grey or nearly black, deeply cracked into thick rectangular scales, somewhat soft and light pinkish-white; inside with distant strands of pure white, .5-7 in. thick. *Leaves* 2-5 by 1.5-3.5 in., suborbicular-ovate or elliptic, closely serrulate, subacute, obliquely rounded or subcordate at the base, dark-green and glabrous above, densely grey or rusty-felted beneath; basal nerves three, lateral sometimes forked, each closely penninerved; petiole 3-5 in. long, stout, tomentose; prickles few, usually solitary, recurved with laterally compressed often pubescent base. *Cymes* arranged in long axillary or terminal panicles, which are often up to 1 ft. in length, sometimes leaf bearing, rusty tomentose throughout. *Flowers* .2-.25 in. across, yellowish green. *Calyx*-lobes ovate, orbicular, membranous, rusty-tomentose outside, puberulous within, not keeled. *Petals* 0. *Disk* 5-angled, thin, hairy. *Ovary* 2-celled, very hairy; styles 2, united below the middle. *Drupe* .3-.5 in. long, globose or pyriform, 1-celled, 1-seeded; stone crustaceous.

Throughout the province up to about 2000 ft. in KHASI HILLS.

The above description refers to the type which occurs in deciduous forests chiefly in the sal tracts of LOWER ASSAM and GARO HILLS.

Wood reddish, tough, weighing about 40 lbs. per c. ft. The ripe fruit is eaten.

Flrs 3-4.

Var. *glabrescens* Prain differs by being generally scandent in ASSAM. Leaves narrower, not felted underneath. Drupes larger. This variety is common in evergreen forests of UPPER ASSAM, specially SIBSAGAR. The fruit is edible but has very scanty flesh.

Flrs. 3-4. Fr. 5-7.

6. *Zizyphus funiculosa* Ham. Vern. *Bon-Boguri*, Ass. (Sib.); *Tatke-iubi*, Miri and Abor; *Ingsu-dompo*, Mik.

Generally a large, armed, scrambling shrub; young shoots rusty pubescent; bark dark-green, sparingly lenticelled, otherwise nearly smooth. Leaves 2-5 by 1-2 in., ovate or elliptic oblong, obtusely acuminate, finely crenulate, thinly coriaceous, glabrous, shining above, strongly 3-nerved and often with one or two slender additional costal nerves; lateral nerves with 5-10 strongly arched, slender branches towards the margins; tertiary nerves transverse, very close, parallel, with very fine reticulations between; base oblique; petiole 2-3 in. long, slightly channelled, prickles short, recurved, usually solitary. Flowers greenish-white, sweet-scented, in axillary and terminal pedunculate, panicle cymes; pedicels very short. Calyx rusty-velvety outside; lobes slightly puberulous within, faintly keeled. Petals clawed, cucullate, spreading. Disk rather flat, obscurely 8-10 lobed, glabrous. Ovary 2-celled, glabrous; styles 2, connate only at the base, divergent. Drupe 5-7 in. long, obovoid, laterally compressed, furfuraceous-tomentose outside, yellow when ripe, with scanty flesh; stone 1-celled, crustaceous, fibrous outside.

Very common in evergreen forests in the FRONTIER DISTRICT, LAKHIMPUR and SIBSAGAR; also SYLHET, CACHAR and according to Hooker the KHASI HILLS.

The ripe fruit is eaten.

Flrs. 2-4. Fr. 5-6.

HOVENIA Thunb.

Hovenia dulcis Thunb. The coral tree. Vern. *Chetia-bola*, Ass.; *Pike-asing*, *Sinke-laktok*, Abor; *Pinke-asing*, Miri; *Langta-krem*, Khasi; *Dieng-mylliati*, Synt.; *Bol-phukrum*, Garo.

A middle-sized unarmed deciduous tree up to 89 ft. in height and 6 ft. in girth; young shoots generally tomentose; bark green and smooth on branches, greyish white and fairly plain on very old trees, reticulately furrowed and brownish on adult trees, fibrous and reddish inside, often with concentric bands of brown or yellow and distant streaks of white, bright red underneath the cork. Leaves 4-7 by 2.5-4.5 in., somewhat obliquely ovate or elliptic to suborbicular ovate, long acuminate, sharply serrate, membranous, glabrescent above, more or less pubescent beneath along the nerves, 3 nerved at the base, the midrib pinnately

branched into 2-5 convergent secondary nerves on either side; the side ribs branched only on the outer side into 6-10 secondary nerves; tertiaries faint, transverse; base abruptly cuneate; petiole 5-1.5 in. long, slender, pubescent; stipules 1 in. long, lanceolate, deciduous. *Flowers* 2-sexual, white, about 2 in. across, in terminal and axillary peduncled 2-chorotomously branched tomentose cymes, 1-3 in. long; peduncles and ramifications stout, pedicels very short. *Calyx* 5-fid; tube funnel-shaped; lobes elongate-triangular, faintly keeled. *Petals* 5, clawed, cucullate. *Stamens* 5, slightly exceeding the petals. *Disk* lining the *calyx-tube*; margin hairy. *Ovary* 3-celled, conical; style 3-fid at the apex. *Fruit* about 3 in. across, 3-celled, 3-seeded; pericarp coriaceous, separating from the thin papery whitish endocarp; seeds orbicular, 12-15 in. across, plano-convex, black, shining. The peduncle and other parts of the inflorescence thicken into a fleshy mass when the fruit ripens, in which it then appears imbedded.

In the hills or on hilly ground up to 5,500 ft. Khairam to Charduar on the north bank of the Brahmaputra and from Margherita to Sonaikusi Reserve. NOWGONG on the south bank, also KHASI & GARO HILLS, N. E. FRONTIER & LAKHIMPUR; Shamuka Block, GOALPARA—Purkayastha. Not recorded from SYLHET, CACHAR.

The wood is dull-white, light, porous, not used except as fuel, the swollen peduncle etc. is sweet in fruit and is eaten.

Flrs. 5-6. Fr. 12-1.

5. BERCHEMIA Neck.

Berchemia floribunda Wall. Vern. *Thu-ri-lang*, Khasi (Shill.); *Mei-rong-tom*, Khasi (Nongkhlaw).

A handsome unarmed climbing shrub; bark thin, green on branches, whitish outside on old stems, peeling off to expose a purple inner layer. *Leaves* 2-4 by 1-2 in., ovate or oblong, symmetrical, shortly but finely acuminate, entire or with a wavy margin, chartaceous, glabrous, rounded or slightly subcordate at the base; lateral nerves 10-12 on either half; straight and parallel, slender, but very distinct on both surfaces, inclined at a narrow angle to the midrib, tertiaries very fine and close, transverse, subparallel, often anastomosing; petiole 5-1 in. long, slender, terete; stipules intra-axillary, small, 2-fid. *Flowers* up to 1 in. across, 5 merous, fascicled on branches of very large terminal panicles, thinly covered with curled hairs; lower branches often from axils of reduced leaves; pedicels up to 1 in. long, buds globose, about .05 in. across, bracteoles small, broad, ovate, deciduous. *Calyx* 5-fid; lobes triangular. *Petals* 5, spatulate. *Disk* lining the calyx tube, margins free. *Ovary* sunk in the disk but free, 2 celled, narrowed into the 2-fid style. *Fruit* a fleshy drupe, seated on the calyx-tube, ovate-oblong or cylindrical, 3-5 in. long, covered with a purple bloom; stone 2-celled, 2 seeded.

KHASI HILLS, 3-6000 ft., not very common. Chiefly in shady ravines.

Flrs. 7-9. Fr. 5-6.

6. SAGERETIA Brongn.

Straggling unarmed or spinescent shrubs; branches usually fluted or angular, opposite. *Leaves* mostly opposite or subopposite, penninerved; stipules small, deciduous. *Flowers* 2-sexual, 5-merous, sessile, in clusters supported by bracts, arranged in spiciform terminal or axillary panicles. *Calyx* cup-shaped; segments keeled inside, persistent. *Petals* 5, clawed, hooded. *Stamens* 5, as long as the petals. *Disk* cup-shaped; margin free, 5 lobed. *Ovary* 3-celled; styles 3, connate, short; stigma capitate. *Fruit* a drupe with 3 indehiscent 1-seeded pyrenes; cotyledons foliaceous; albumen thin.

Leaves glabrous, lateral nerves 6-10
on either half; panicles short,
often axillary.

... 1. *S. hamosa*.

Leaves pubescent beneath, lateral nerves
5-8 on either half; panicles
large, terminal.

... 2. *S. oppositifolia*.

1. *Sageretia hamosa* Brongn.

A woody straggling or bushy shrub; branches terete; branchlets angled, sometimes transformed into short straight or hooked spines. *Leaves* 1.5-3.75 by .8-1.5 in., lanceolate or oblong, bluntly acuminate, closely and sharply serrate, thinly coriaceous, glabrous but sometimes with scattered hairs along the nerves beneath, dark-green and shining on both surfaces; lateral nerves 6-10 on either half, depressed above, very prominent beneath; tertiary nerves parallel and transverse; base rounded, symmetrical: petiole 2-4 in. long, finely channelled. *Panicles* 3-5 in. long, often with a few obovate, leaflike-bracts about .4 in. long, densely grey tomentose. *Flowers* small, in congested clusters. *Calyx* teeth triangular, erect, about .1 in. long, membranous, keeled inside, puberulous. *Disk* fleshy. *Drupe* about .25 in. long, obovoid, smooth, dark-brown, glaucous, with 2-3 pyrenes.

Only found so far in the KHASI HILLS 5000 to 5500 ft. e. g. Kynshi and and Nongkersin.

Flrs. and Fr. 9-11.

2. *Sageretia oppositifolia* Brongn.

A shrub of the same habit and general appearance as the foregoing species. *Leaves* thinner, usually short, acuminate, sometimes subentire; lateral nerves 5-8 on either half, often subcordate at the base, more or less tomentose beneath, specially when young. *Inflorescence* mostly terminal, often running down into the leaves. *Flowers* in congested clusters. *Calyx* lobes exceeding the tube. *Petals* keeled on the back. *Drupe* turbinate about .25 in. long, succulent and black when ripe.

KHASI and NORTH CACHAR HILLS up to 2000 ft. not very common.

Flrs. Rains. Fr. Cold weather.

7. RHAMNUS Linn.

Shrubs or small trees, usually erect, often spinescent. *Leaves* alternate, but in some species so close as to appear opposite or fascicled, serrulate. *Flowers* small, sometimes polygamous, in axillary clusters or panicles, rarely solitary; pedicels unequal. *Calyx* 4-5 fid; tube cup-shaped; lobes keeled within. *Petals* 4-5 or 0. *Stamens* 4-5, opposite the petals, inserted on the edge of the disk; filaments short. *Disk* thin, lining the calyx-tube. *Ovary* free, 3-4 celled, tapering to a 3-4 cleft style. *Fruit* drupaceous, generally black when fully ripe; stones obovoid; albumen fleshy.

Spinescent shrub or small tree; branches shining.

Flowers 4-merous.

Unarmed rambling shrub; branches not shining. Flowers 5-merous.

.. *R. virgatus*.

.. *R. nepalensis*.

1. *Rhamnus virgatus* Roxb. Syn. *R. dahuricus* F. B. I.

A shrub not exceeding 10 ft. in height in Assam, deciduous, generally with a stout spine at the forks of the branches; bark dark grey, thin, smooth, shining, peeling off in horizontal rolls. *Leaves* subopposite, opposite or fascicled on arrested branchlets, variable, 5-22 by 3-1 in., rhomboidal, obovate to ovate-lanceolate or narrow elliptic-lanceolate, acuminate, minutely serrulate to finely serrate, membranous, slightly pubescent beneath when young; lateral nerves generally 3 on either side of the midrib, rarely 2 or 4-5, slender, much arched, depressed above; tertiaries transverse, parallel, faint; base acute or cuneate; petiole 1-5 in. long. *Flowers* small, pale-green, 4-merous, unisexual, in dense axillary fascicles; buds pointed; pedicels filiform, long or short. *Calyx-tube* campanulate. *Petals* minute, spatulate. *Fruit* 15-25 in. long, globose; stones 2-4, dark brown, grooved, groove narrow, closed except near the bottom.

KHASI and JAINTIA HILLS, 4-5,500 ft., Kynshi, Nongkaseu, Nongspung, etc. generally on the outskirts of scrub forests.

Wood hard, fairly heavy and close-grained, capable of being used for agricultural implements. The fruit is very bitter and has emetic and purgative properties.

Firs. 4-6. Fr. 9-11. Often fl. and fr. throughout the year.

2. *Rhamnus nepalensis* Wall. Vern. *Biringa*, *Biring-guli*, Ass.; *Biring-karing-astng*, Miri; *Nakaling-arong*, *Ringkang-ak-ik-arong*, Mik., *Midoubri-doulcha*, Kach.; *Thelu-rikang*, N. C. Hills.

A bushy shrub with many long straggling branches; bark thin, blackish and more or less smooth outside, yellow inside, young shoots puberulous. *Leaves* 2-5 by 1-2.5 in., oblong, elliptic or ovate, abruptly short acuminate, serrulate, membranous, glabrous, dark-green and shining above, usually with tufts of hairs on the axils of lateral nerves beneath, yellow when old; lateral nerves 5-7 on either half, slender, slightly arched, tertiary nerves transverse, obscure; base more or less rounded; petiole

2-1 in. long, channelled. *Flowers* very small, green, fascicled in simple or panicked pubescent racemes, often with leaf-like bracts; panicle branches usually 1-2·2 in. long; pedicels 1-2 in. long. *Calyx* salver-shaped, small, tube persistent, accrescent. *Petals* oblong, concave. *Style* 3-4 cleft at the apex. *Drupe* 2-2·5 in. long, obovoid, dark-red when ripening, black when fully ripe.

Throughout the BRAHMAPUTRA VALLEY from Sadiya to Bijni, generally about streams. Also in the KHASI and JAINTIA HILLS up to 4000 ft.

Flrs. 10. In some localities 4. Fr. 11.

8. GOUANIA Linn.

Gouania leptostachya DC. Vern. *Jwarpat*, Ass.; *Iehhalot*, Sylh.; *Sanjari-bandev*, *Dou-shrem*, Mech; *Dugithang*, *Dibok-pak-bidu*, *Lumigong*, Garo; *Jermet-ja-main*, *Mei-tein-iang*, Khasi.

An unarmed climbing shrub with grey bark bearing tendrils at the ends of the branchlets; branches glabrous; young parts and inflorescence pubescent. *Leaves* alternate, 2-4 by 1·5-2·5 in., ovate, acuminate, crenate, crenatures glandular, subcoriaceous, sparsely rusty-pubescent beneath when young; lateral nerves 5-6 on either side of the midrib, generally opposite, the lowest pair sub-basal and laterally branched; base rounded or subcordate; 3-1 in. long, slender, pubescent; stipules with persistent base and caducous apex. *Flowers* white, 1·5 in. across, in clusters on axillary or terminal, often leaf-bearing racemes, which are 6-12 in. long and usually unbranched. *Calyx* superior, 5-fid, keeled within at the apex. *Disk* 5-angled, angles produced into horn-like processes opposite the calyx lobes. *Petals* 5, inserted below the margin of the disk. *Stamens* 5, infolded by the petals. *Ovary* 3-celled, sunk in the disk; style 3-cleft. *Fruit* 5 in. long, 3-winged, 3-celled, 3-seeded, crowned by the remains of the calyx, separating into 3 1-seeded cocci through the wings; seeds somewhat laterally compressed, dorsally convex, polished.

Common in both VALLEYS and up to 2000 ft. in the GARO, KHASI and NORTH CACHAR HILLS.

Water mixed with bruised leaves is used for bath by patients suffering from fever.

Flrs. 8-10. Fr. 11-12.

FAM. 42. AMPELIDACEÆ.

Erect or climbing shrubs, the latter usually cirrhone, generally with copious watery juice; stems and branches nodose. *Leaves* alternate, simple-lobed, digitate or pedate, less often pinnate or 2-3-pinnate, stipulate; petiole thickened at the base. *Flowers* regular, 2-sexual or 1-sexual, in panicles, umbellate, corymbose or spicate cymes which are opposite the leaves or axillary; peduncles tendril-bearing or transformed into tendrils. *Calyx* small, entire or 4-5-toothed or -lobed. *Petals* 4-5, valvate, free or connate. *Disk* free or adnate to the petals, stamens or ovary. *Stamens* 4-5, opposite the petals, inserted at the base or between the lobes of the disk; filaments subulate; anthers 2-celled, introrse. *Ovary* 2-6-celled with 1-2 ovules in each cell; ovules anatropous; raphe ventral; style short. *Fruit* a berry, 1-6 seeded. *Seeds* erect; albumen cartilaginous, sometimes ruminant; radicle short, inferior.

Climbers, usually tendril-bearing; stamens free; ovary 2-celled; cells 2-ovuled.
Erect shrubs or herbs. Stamens connate at the base; ovary 3-6 celled; cells 1-ovuled.

- | | |
|----|-------------------|
| .. | 1. <i>Vitis</i> . |
| .. | 2. <i>Leea</i> . |

1. *VITIS* Linn.

Climbing shrubs or perennial herbs, sinistrorsely twining, usually with leaf-opposed tendrils. *Leaves* simple or 3-foliolate, or digitately or pedately 5-9-foliolate; stipules when present, adnate to the petiole, membranous. *Flowers* usually 2-sexual, sometimes polygamous, ebracteate in cymes disposed in racemes, corymbs, spikes, panicles or umbels. *Calyx* small, 4-5-toothed or -lobed, rarely entire. *Petals* 4-5, cohering at the apex or free. *Stamens* 4-5, inserted below the margin of the disk; anthers free. *Ovary* usually 2-celled with 2-ovules in each cell; style short or 0. *Fruit* berry-like, 1-2-celled. *Seeds* 2-4, with a hard testa; albumen—cartilaginous; embryo minute.

Planchon in his monograph in vol. V of De Candolle's *Monographiæ Phanerogamarum* divided *Vitis* up into a number of genera. As the entire group can be easily made out in the field, it has been kept in tact and arranged under one key for the convenience of Foresters in the field. The following is a key to the genera of Planchon into which the species described here mainly belong :-

I. Fls. polygamous :-

- A. Inflorescence usually bearing tendrils on the peduncles; stigma simple :-
 Petals 3, usually calyptrae. *Leaves* simple.
 Petals 4-5, free. *Leaves* simple or digitate.

- | | |
|----|-----------------------|
| .. | <i>Vitis</i> . |
| .. | <i>Ampelocissus</i> . |

- B. Inflorescence not tendril bearing ; stigma 4-lobed :-
 Leaves 3-foliolate or pedately 5-7 foliolate, sometimes 2-1 foliolate by reduction. .. *Tetragastigma*,
- II. Flrs. hermaphrodite -
- A. Petals 5, less often 4, free or sometimes calyptrate ; style short ; stigma capitate. Leaves trifoliolate. .. *Pterisocissus*.
- B. Petals 4, at first connivent, then free :-
1. Leaves usually simple, sometimes 3-foliolate ; fruit 1-seeded. .. *Cissus*.
2. Leaves 3-foliolate, digitate or pedate ; fruit 2-4 seeded. .. *Cayratia*.
- I. Leaves simple often angled or lobed :-
- A. Flowers 4-merous, 2-sexual, in corymbose or umbellate cymes ; inflorescence not tendril bearing :-
1. Stem 4-winged, jointed, fleshy. .. 1. *V. quadrangularis*.
2. Stem not winged :-
- a. Leaves glabrous or nearly so :-
- i. Young shoots glaucous or mealy white. .. 2. *V. repens*.
- ii. Young shoots not glaucous :-
- Leaves variegated ; a slender climber. .. 3. *V. discolor*.
- Leaves not variegated ; a heavy woody climber. .. 4. *V. assamica*.
- b. Leaves more or less hairy :-
- i. Stem hard and woody, bark not corky ; leaves ovate, never broader than long ; dry seeds pitted with angled facets. .. 5. *V. adnata*.
- ii. Stem soft-wooded, bark corky, furrowed ; leaves broad-ovate to orbicular, sometimes broader than long ; dry seeds not faceted. .. 6. *V. repanda*.
- B. Flowers 5-merous, usually polygamous ; inflorescence tendril bearing :-
1. Large woody climbers :-
- Young shoots, peduncles and petioles with long glandular hairs. ... 7. *V. barbata*.
- Glandular hairs absent ; young parts tomentose. .. 8. *V. lanata*.
2. Climbers with herbaceous stems :-
- a. Extensive climber, leaves membranous, glabrous when mature. .. 9. *V. latifolia*.
- b. Trailing creepers with short annual stems :-
- Leaves persistently tomentose beneath ; inflorescence wooly. .. 10. *V. rugosa*.
- Leaves & inflorescence glabrous. .. 11. *V. sikkimensis*.
- II. Leaves usually 3-foliolate, rarely 5 or 1-2 foliolate ; inflorescence tendril bearing :-
- Flrs. polygamous, 5-merous. .. 12. *V. divaricata*.
- III. Leaves 3-foliolate ; inflorescence not tendril bearing :-
- Flrs. usually 4-merous ; rarely 5-merous :-
- A. Flrs. 2-sexual :-
- Stem fleshy, (except towards the base),

- leaves pinnately 3-foliolate, leaflets more or less fleshy.
Stem woody, robust, leaves palmately 5-foliolate, leaflets coriaceous.
- .. 13. *V. trifolia*.
- .. 14. *V. semicordata*.
- B. Flrs. polygamo-dioecious :-
1. Fruit turbinate or globose ; leaflets thin ; stems slender :-
Cymes lax, on long peduncles ; flrs. pale yellow, minute ; stigma 4-lobed.
Cymes dense, almost sessile ; flrs. green not minute ; stigma peltate.
- .. 15. *V. bracteolata*.
- .. 16. *V. angustifolia*.
2. Fruit subfalcately oblong or oblong, stem rather stout, softwooded with corky furrowed bark, leaflets coriaceous.
- .. 17. *V. campylocarpa*.
- IV. Leaves *digitately* 5-foliolate ; stem more or less flattened ; inflorescence not tendril bearing ; flrs. 4-merous :-
- A. Leaflets glabrous :-
Stigma undivided. Flrs. 2-sexual. Fruit elliptic about 1 in. long, 1 seeded.
Stigma 4 lobed. Flrs. polygamo-dioecious. Fruit globose, about 5 in. long, 1-2 seeded.
- .. 18. *V. elongata*.
- .. 19. *V. planicaulis*.
- B. Leaflets fulvous pubescent ; fruit globose, about 5 in. across, 2-seeded.
- .. 20. *V. obovata*.
- V. Leaves mostly *pedately* 5-foliolate, inflorescence tendril bearing ; flrs. 4-merous :-
- A. Leaflets glabrous :-
- i. Slender climbers ; leaflets thin :-
- a. Leaflets chartaceous ; cymes umbellate :-
Tendrils forked near the apex :- flrs. polygamo-dioecious.
- .. 21. *V. capriolata*.
- b. Leaflets membranous ; cymes corymbose :-
Cymes compact, usually short. Flrs. polygamo dioecious. A slender woody climber ; tendrils unbranched.
Cymes lax, long peduncled. Flrs. 2-sexual. A herbaceous climber.
- .. 22. *V. oxspifolia*.
- .. 23. *V. tenuifolia*.
- ii. Heavy climbers ; leaflets coriaceous, branches warty :-
Fruit smooth ; cymes short and compact.
Fruit with a distinct ring often with minute tubercles below the middle.
- .. 24. *V. lanceolaria*.
- .. 25. *V. rumicispeima*.
- [B. Leaflets pubescent, membranous ; branches slender ; cymes lax ; flrs. 2-sexual.
- .. 26. *V. japonica*.
- VI. Leaves mostly *pedately* 5-7 foliolate ; leaflets membranous, pubescent or glabrate. Flrs. 2-sexual.
- .. 27. *V. pedata*.]

- VII. Leaves pinnately 7-11 foliolate ;
leaflets stalked, usually
pubescent.

.. 28. *V. rubifolia*.

1. *Vitis quadrangularis* Wall. Syn. *Cissus quadrangularis* Linn.
Vern. *Harjora*, *Harenga*, Beng.

Stem stout, fleshy, quadrangular and 4-winged, contracted at the nodes, dichotomously branched, climbing on tall trees or spreading on bushes, nearly deciduous. *Leaves* simple, 1-2 in. long and nearly as broad, cordate or reniform, sometimes 3-5-lobed, fleshy, entire or crenate-serrate, glabrous and smooth on both surface ; petiole short ; stipules moon-shaped, entire. *Tendrils* long, simple, leaf-opposed. *Cymes* axillary, umbelliform, shortly peduncled, small, glabrous. *Flowers* cymose, 4-merous, whitish. *Petals* 4, at first connivent, afterwards free. *Stamens* 4 ; filaments slender. *Disk* adnate to the base of the 2-celled ovary, erect ; style slender, short. *Fruit* .25 in. diam., globose, usually 1-seeded, succulent, red when ripe, very acid.

SYLHET and possibly also CACHAR.

The young shoots are eaten in curries and the juice of the stem has valuable medicinal properties.

Fls. 7-9. Fr. 11-1.

2. *Vitis repens* W. & A. Syn. *Cissus repens* Lamk. Vern.
Mei-hur-jarap, *Mei-ja-khajrap*, Khasi ; *Ja-iaw-ehhrub*, Synt.

A handsome trailing glabrous plant ; young shoots succulent, red, covered with a white bloom, pleasantly acid. *Leaves* simple, 2-8 by 1.5-5 in., ovate, broadly cordate, acute, repand, often with a few distant cusps, pale-green, membranous, glabrous ; lateral nerves 3-4 on either half above the basal, arched ; petiole 2-3.5 in. long ; stipules small, rounded, glabrous. *Tendrils* 8-10 in. long, fleshy, usually forked. *Flowers* 4-merous, in compound few-flowered umbels ; peduncles 1-4 in. long, axillary ; pedicels slender, .5-1 in. long. *Calyx* truncate. *Petals* .1-1.5 in. long, triangular, ovate. *Style* conspicuous. *Fruit* globose, about .16 in. in diam., red but turning black when fully ripe ; generally 1-seeded ; seed globose, pyriform, albumen ruminant.

KHASI HILLS, 1-4,600 ft., generally in shady valleys, NAGA HILLS, also NORTH CACHAR HILLS-Phulertul and probably in hilly country in other districts.

The leaves and tender shoots are eaten cooked.

Fls. & fr. 11-1.

3. *Vitis discolor* Dalz. Syn. *Cissus discolor* Bl.

A weak glabrous climber with a woody base ; branches subangular, red and smooth, not glaucous. *Leaves* generally 2-5 by 1-3 in., ovate-lanceolate, acute or acuminate, base cordate to subtruncate bristly or crenate-serrate, membranous, glabrous, generally with irregular translucent white blotches on the upper surface, purple underneath ; lateral nerves 3-5 on either half above the middle ; slender, arched ; petiole .3-1 in. long ; stipules

oblong, membranous and somewhat hyaline. *Tendrils* generally forked. *Flowers* 4 merous, in small compound puberulous umbels; peduncles leaf-opposed, scarcely exceeding .5 in. in length; primary branches .6-.8 in. long; ultimate pedicels .1-2 in. long, very slender. *Calyx* truncate, fleshy. *Petals* .12 in. long, yellowish, glabrous, thickened at the apex. *Disk* 4 lobed. *Style* conspicuous, simple. *Fruit* reddish-purple to black. *Seed* as of *V. repens*.

NAGA HILLS, KHASI HILLS, 3-4,000 ft. also MANIPUR.
Fls. 6-9 Fr. 9-11.

4. *Vitis assamica* Laws. Syn. *Cissus assamica* Craib nov. comb.

A heavy rigid climber, glabrous except very young shoots branches sub-angular, woody. *Leaves* orbicular-cordate, suddenly acuminate, bristly serrate with margins recurved, subcoriaceous, strongly nerved beneath; tendrils simple. *Flowers* 4-merous, in axillary compound umbellate cymes, common peduncle .7-2.5 in. long, pedicels .15-.2 in. long, filiform. *Petals* distinct; style about .1 in. long. *Fruit* turbinate, about .25 in. long, 1-seeded, juicy, edible; seed .2 in. long, pyriform, smooth (in herbarium specimens*) with a continuous ridge from face to back.

ASSAM PROPER and CACHAR.

Planchon in his monograph (Vol. V, p. 495 De Candolle's Monographiæ Phanerogamarum) includes this plant under "*Cissus adnata forma glabrior*." The seeds of the plant described as *Vitis adnata* Wall. in F.B.I., are however very different to those of *V. assamica*; the two cannot therefore be grouped together.

5. *Vitis adnata* Wall. Syn. *Cissus adnata* Roxb. in part. vern. *Pani-lara*, Nep.; *Down-rang*, Kuki; *Bhatia-lot*, Sylh.

A long but slender climber with woody stem; branches, leaves beneath and inflorescence rusty pubescent. *Leaves* simple, 3-6 by 2-5 in., ovate-orbicular, cordate, shortly acuminate, bristly serrate, membranous, intricately rusty-tomentose beneath, glabrescent and dark-green above; basal nerves 3-5, lateral nerves 4-6 on either side of the midrib, above the basal, slender, only slightly arched, nerves excurrent into teeth; petiole .3-2 in. long; stipules oblong, more or less adnate, small, with a shining centre and a thin translucent margin. *Tendrils* forked, woody. *Cymes* axillary, umbelliform, generally compound, more or less compact; common peduncle .5-2 in. long, bracteoles very small, caducous. *Flowers* 4 merous. *Petals* distinct, greenish-yellow, about .05 in. long, oblong-ovate, hooded, pubescent outside; style columnar. *Fruit* about .3 in. long, obovoid, black, smooth, 1-seeded, on recurved and thickened pedicels; seed obliquely pyriform, pitted with irregular polygonal depressions. †

Throughout the plains and up to 3,000 ft. in the hills, neither rare nor very common.

* According to Haines with flabellate scales in fresh specimens..

† According to Haines not evident in ripe fresh seeds

A decoction of the dried root-stocks is used in *W. India* as a diuretic and blood purifier.

Fis. 10-11. Fr. II-I.

Cissus dispersa Hutch. Syn. *C. latifolia*, Vahl. Vern. *Bhatiga-lot*, Sylh.

A woody climber with woolly innovations, branchlets slender; tendrils sometimes forked. *Leaves* 2-3.5 in. by 1.25-3 in., acuminate, nerves ending in fine teeth; glabrate above, more or less floccose-tomentose beneath; petiole 1-2 in. long, tomentose. *Flowers* 4-merous, in compound umbellate cymes, peduncles short, usually up to 1 in. long, usually leaf opposed. *Calyx* nearly truncate or lobes short. *Petals* thinly hairy outside; style long, subulate. *Young* fruits obovoid.

SYLHET—Kanjilal sheet No. 4679.

Lawson in F. B. I. had included this plant under *V. adnata*. Further examination is needed to confirm its specific rank.

6. Vitis repanda W & A. Syn. *Cissus repanda* Vahl. Vern. *Medmedia-lot*, Ass. (Sibs.); *Pani-bel*, Hind.

A large climber; young parts adpressed woolly; stem soft and very porous, reticulately corky when old. *Leaves* simple, 4-8 by 3-6 in., sometimes broader than or at least as broad as long, suborbicular, deeply cordate, 5-sometimes 7-angled or -lobed, dentate-serrate, shortly acuminate, membranous, glabrescent except on the nerves beneath with age, basal nerves 5, outermost pair branched from near the origin; secondary nerves 4-6 on either side of midrib above the basal, slender, slightly arched; petiole 3-5 in. long; stipules almost free, hairy, oblong, rounded, sometimes falcate, 2-3 in. long. *Inflorescence* leaf-opposed, lax, adpressed-hairy, repeatedly umbellately or subcorymbosely branched, the ultimate divisions being of about 20-flowered umbels; peduncle 2-5 in. long, ribbed, hairy; bracts and bracteoles woolly. *Flowers* reddish-brown, 1 in. long, 4-merous, bisexual; petals ovate, oblong, hooded, hairy at the apex. *Disk* 4 lobed. *Fruit* 3 in. long, pyriform, apiculate, 1-seeded. *Seed* pyriform, nearly smooth.

Common in the Sal tracts and other deciduous types of forests.

The stem when cut and detached, yields fairly large quantities of clear potable water which is of great help to workmen and way-farers in waterless tracts.

New leaves and flowers 4-5 Fr. 6-7.

7. Vitis barbata Wall.

A large climber with stout hollow branches easily recognized by the long glandular hairs on the young shoots, petioles and peduncles. *Leaves* 8-12 by 6-9 in., ovate-cordate, acute or acuminate, sometimes faintly lobed, distantly dentate, membranous, glabrate above, generally densely brown-felted-beneath; supra-basal lateral nerves 3-4 on either side of the midrib, the lowermost often forked from near the base; petiole 2-3.5 in. long, tomentose as well as bristly. *Inflorescence* of paniculate cymes laxly ovate in outline, 4-6 in. long; peduncles 4-8 in. long, flattened, glandular-hairy, usually with a long, slender, forked tendril from near its apex. *Flowers* sessile, generally 5-merous. *Fruit* elliptic, 4-6 in. long and 3-4 in. in diam., on short stout pedicels, 1-2-seeded; seed 3 by .15 in., somewhat compressed,

face wedgeshaped, grooved, back with a narrow oblong tubercle from which shallow fissures radiate to the margin.

KHASI HILLS up to 3,000 ft.

The fruit is palatable and is believed to be a possible new source of grapes.

8. *Vitis lanata* Roxb.

A large climber; young parts succulent and generally densely tawny tomentose, old stem woody. *Leaves* simple, very variable in size and shape, generally 2-5 by 1.5-4 in., often as broad as long, sometimes attaining 8 in. or more in length, ovate-orbicular from a cordate or truncate base, acute or acuminate, serrate, often angled or lobed, membranous, generally pubescent or more or less laxly or tomentose with rusty-brown wool beneath, glabrate above; basal nerves about 5, lateral nerves 4-7 on either side of midrib above the basal; petiole terete, .5-4 in. long. *Tendrils* leaf-opposed, generally forked. *Inflorescence* a large paniculate cyme, subcorymbosely branched or thyrsi-form, leaf-opposed; peduncle often bearing a simple or forked tendril. *Flowers* small, green, 5-merous, polygamo-dioecious. *Petals* usually cohering at the apex. *Style* O. *Fruit* globose, succulent, .2-3 in. across, black or dark-purple when ripe, usually 1-2-seeded. *Seeds* about .16 in. long, ob-triangular, slightly emarginate with a spatulate tubercle on the back, face wedge-shaped, 2 furrowed.

Occurs in the KHASI HILLS, 4-6,000 ft.

The root of the plant is eaten, and the fruit of some varieties is edible.

Fls. 5-6. Fr. 9-11.

Var. *glabra* occurs in the Jawai Subdivision, e. g. at Puriem. It differs from the type in having nearly glabrous leaves and thinner stems. *Petiole* slightly pubescent and tufts of scales occur at the axils of the lateral nerves on the under surface of the leaves. *Seeds* up to 4 in each fruit.

Probably the same as *Vitis heyneana* Roem et Schult. as pointed out by Parker in Indian Forester Vol. LIX p 61-63. If this view is correct, this name being earlier should supersede Roxburgh's name.

V. vinifera Linn. The grape vine, belongs to this group of the genus, but the climate of ASSAM is too moist for its successful cultivation.

9. *Vitis latifolia* Roxb. Syn. *Ampelocissus latifolia* Planch. Vern. *Gowalia-lata*, Beng.

A far-climbing herbaceous climber with a perennial rootstock, branches striate, glabrous, smooth; new shoots glaucous, often purplish at the nodes. *Leaves* 4-11 by 3.5-8 in., ovate, deeply cordate, usually 3-5-7-angled or-lobed, crenate-serrate, membranous, glabrous when mature, shining above, 5-7-nerved at the base; lateral nerves 5-7 on either half above the base; petiole about as long as the blade, terete, smooth. *Inflorescence* up to 4 in. long of a compact, ovoid, dense, cyme-bearing panicle on a stout tendril-bearing peduncle. *Flowers* small, reddish-brown, 5-merous, polygamous. *Petals* free, oblong, reflexed. *Style* O. *Berry* about .35 in. long, ellipsoid, black when fully ripe,

usually 2-seeded. *Seed* with margins transversly rugose and a blunt ridge on the face.

The plains of both Valleys, also the KHASI and MIKIR HILLS up to 4,000 ft., generally in village scrub.

Fls. rainy season. Er. 10-11.

10. *Vitis rugosa* Wall (*non* *V. rugosa* Hk.f. et Th = *V. nervosa* Laws). Syn. *V. macrophylla* Madden, *Ampelocissus rugosa* Planch.

A climber usually trailing on the ground, attaining up to 10 ft. *Stem* annual, soft, fairly stout, from a perennial thickened root-stock, reddish with longitudinal furrows, dotted with raised lenticels; young shoots covered with rusty wool. *Leaves* 5-18 in. or more across, suborbicular, orbicular or sometimes broader than long, shallowly 5-7 lobed, lower lobes somewhat obscure, margin sinuate, shortly toothed, more or less pubescent above, densely felted beneath with rusty or brownish tomentum; base deeply cordate, 5-nerved, basal portion of the lowest pair along the sinus and then forked, nerves depressed above, raised beneath; petiole 2-9 in. long, red, stout, striate. *Flowers* small, reddish, 5-merous, in short, leaf opposed, cymose pedunculate panicles of cymes, 1-5 in. long, usually with a bifurcate tendril on the peduncle. *Inflorescence* floccose-tomentose, with stout branches, pedicels very short, stout; petals free. *Berry* 3-4 in. across, black when ripe; seeds 1-4, with a sub-elliptic pit on the back from which fine, short, depressed lines radiate and a broad ridge on the face.

KHASI HILLS on sunny slopes in the open about 4-6000 ft., not common.

The subacid fruit is edible.

Fl. 6-7. Fr. 9-11.

11. *Vitis sikkimensis* Laws. Syn. *Ampelocissus sikkimensis* Planch. Vern. *Jermei-sheo-shao*, Khasi.

Stem weak, trailing, glabrous; young parts often glaucous. *Leaves* with reddish tinge, up to 18 in. across, orbicular-ovate, deeply rounded-cordate, cuspidately denticulate, somewhat abruptly acuminate, membranous, glabrous; petiole 4-6 in. long, tendrils branched. *Inflorescence*—a panicle of umbellate cymes; peduncle 4-5 in. long with a forked tendril a little below the apex; ramifications divaricate, sub-succulent in fruit. *Flowers* 5-merous; petals free. *Berry* 2 in. long, obovoid, 2-seeded, seed with a spatulate tubercle on the back.

KHASI HILLS up to 5500 ft.-Nongstoin, Shillong, etc.

Fls. 7-8. Fr. 9-10.

12. *Vitis divaricata* Wall. Syn. *Ampelocissus divaricata* Planch.

A much spreading climber with thin round stem, branches with a shining reddish cuticle under a fugacious coat of down; bark fibrous, young parts wooly greyish or rufous tomentose.

Tendrils leaf-opposed 6-10 in. long, forked towards the end. *Leaves* 3-foliolate, rarely 5-foliolate, or 1-foliolate; common petiole 3-4 in. long, stout. *Leaflets* 4-6 by 1.5-3 in., variable, terminal, elliptic to lanceolate; lateral oblique and semicordate, finely acuminate, cuspidate dentate, subentire or sometimes lobed, membranous, glabrate above, more or less softly rusty-pubescent beneath; lateral nerves 9-10 on either half, slender, much-arched, mostly opposite or subopposite, tertiary nerves transverse; terminal petiole about 1 in. and lateral 2-3 in. long. *Flowers* 5-merous, polygamous, reddish-brown, in pubescent long-peduncled compact 2-3 chotomous cymes. *Peduncle* up to 5 in. long, forked near the top into a long tendril. *Cyme* branches divaricate with linear bracts at the forks. *Petals* hooded. *Disk* cupular, 10-pleated or lobed. *Style* short. *Berry* about .4 in. long, globose, ellipsoid, black when ripe. *Seed* flat, obovate or elliptic with a pit on the back from which fine grooves radiate, and a ridge on the face which broadens upwards.

Not uncommon in damp evergreen forests of UPPER ASSAM, e. g. Makum, Margherita, etc.

Fl. 6(?) -9. Fr. 10-12.

13. *Vitis trifolia* Linn. Syn *V. carnosa* Wall. *Cayratia carnosa* Gagnepain. Vern *Chepeta-lot*, Ass.; *Takigokang*, Miri; *Amal-kata*, Beng.

A climber with soft stem which becomes flattened with age; young parts pubescent; shoots striate. *Tendrils* wiry, usually branched, often ending in adhesive disks. *Leaves* usually pinnately 3-foliolate -sometimes 2- or 1-foliolate by reduction; common petiole 1-4 in. long, somewhat fleshy, stipules scarious, about .4 in. long. *Leaflets* 2-6 by 1-4 in. long, terminal largest, lateral smaller, usually oblique, sometimes lobed on the broader side, ovate, obovate or elliptic, sharply or broadly acute; base cuneate or rounded, coarsely-toothed, rather succulent, glabrate or more or less pubescent on both surfaces; petiolules of lateral leaflets short. *Inflorescence* up to 8 in. long, leaf-opposed or axillary, of long peduncled, compound, pubescent cymes, initial branches of which are 2-3—sometimes 5 rayed—from the peduncle; peduncle as long as or longer than the petiole and about as thick. *Flowers* small, 2-sexual, 4-merous, greenish. *Calyx* subtruncate; petals free, hooded at the tips; disk 4-lobed, white, crenate; style subulate. *Berry* .3-.4 in. long, obovoid or globose, apex depressed, crowned with the remains of the style, usually 2-4 seeded. *Seeds* trigonous, sharply angled and ridged on the face, sides compressed, back rounded, with a linear depressed tubercle.

Fairly common, specially in evergreen forests in UPPER ASSAM.

Flrs. 5-8 Fr. 9-12.

The plant is variable in habit. The stem is sometimes herbaceous and annual from a perennial base and is sometimes softly woody, though

succulent. In the evergreen types of forests it is often a large climber and is generally robust in all its parts. In its ordinary state on the other hand it has annual shoots from a perennial base.

14. *Vitis semicordata* Wall. Syn. *V. himalayana* Brand.
Parthenocissus semicordata Planch.

A large climber with woody stem; young parts herbaceous, glabrous or slightly pubescent. *Bark* brown, rough, deeply furrowed, fibrous. *Leaves* 3-foliolate; common petiole 4-6 in. long, slender, often sparsely and patently pubescent. *Leaflets* subcoriaceous, glabrous and shining above, of a lighter colour and often pubescent along the midrib and nerves beneath, showing beautiful yellow, orange and red autumnal-tints before falling, sharply serrate, finely and often somewhat abruptly acuminate, secondary nerves 7-8 on either half, tertiary nerves very closely and finely reticulate; terminal leaflet 3-4 in. by 2-3 in., ovate, obovate or rhomboid; base cuneate, petiolule .3-.5 in. long; lateral very oblique on short petiolule, outer half rounded or semicordate, inner acute at the base. *Tendrils* branched, ending in adhesive disks or sometimes 0. *Flowers* yellowish-green, 2-sexual, 4-merous or 5-merous, in 4-6-flowered umbels which are borne on 3-sometimes 2-chotomously branched terminal or leaf-opposed panicles, 2-4 in. long; buds .15 in. long, ovoid-oblong; calyx salver-shaped. *Petals* ending a conical hood, reflexed when the flower opens. *Style* short, stout, red. *Berry* globose the size of a pea, 4-seeded, black when ripe; seeds smooth, black.

KHASI and NORTH CACHAR HILLS 2-6,500 ft., NAGA HILLS.

The wood has a pretty silver-grain and can be used for picture-frames and such other purposes.

Figs. 5-8. Fr. Cold season.

15. *Vitis bracteolata* Wall. Syn. *Tetrastigma bracteolatum* Planch. Vern. *Soh-mei-boit*, Khasi; *Duruje-doukha*, Cach.

A handsome vine with slender, wiry, glabrous, reddish, woody stem. *Leaves* 3-foliolate; common petiole 2-3.5 in. long, slightly swollen at the base. *Leaflets* 2-5 by 1.5-2.5 in., ovate or ovate-lanceolate, the lateral somewhat oblique, acute or acuminate, distantly cuspidate-serrate, membranous or thinly coriaceous, glabrous, puberulous or with curled hairs on the nerves beneath, main lateral nerves 5-10 on either side of the midrib, very slender, much arched; ending in serratures; base rounded or slightly cuneate; petiolules slightly puberulous, lateral 2-5 in., terminal .5-1 in. long. *Inflorescence* axillary, upto 4 in. long, of pubescent or puberulous, paniced, cyme-bearing corymbs upto 3 in. long with divaricate ramifications. *Flowers* 4-merous, diœcious, whitish, very small on short filiform pedicels, pubescent outside. *Petals* distinct. *Style* 0; stigma 4 lobed. *Berry* .2-.25 in. diam., globose, black when ripe, 1-3-seeded. *Seeds* more or less horizontally wrinkled with two ridges on the back between which is a linear furrow and dotted all over the minute yellowish raised dots.

Throughout the plains of the Province and upto about 2,000 ft. in the hills, generally in scrub forest.

Fls. 9-11. Fr. 1-2.

16. *Vitis angustifolia* Wall. Syn. *Tetrastigma Thomsonianum* Planch. Vern. *Nekum-riubi*, Miri.

A herbaceous climber with dark-coloured usually flattened stem. *Leaves* 3-foliolate; common petiole 2-3 in. long, glabrous; stipules ovate-oblong, about 15-25 in. long, coriaceous. *Leaflets* 3-6 by 1-1.5 in., lanceolate or elliptic-lanceolate, distantly serrate, acuminate, glabrous or puberulous on the mid-rib; main lateral nerves 5-7 on either half, slender. *Tendrils* simple, leaf-opposed, very slender. *Cymes* axillary, short—shorter than the common petiole, dense, usually very shortly peduncled, pubescent. *Flowers* 4-merous, diœcious, green. *Petals* free. *Style* 0; stigma large, flat, scarcely lobed. *Berry* globose, about .2 in. across, not juicy, 2-4 seeded. "*Seeds* furrowed on each face and transversely rugose on the sides"—Haines.

Not uncommon in the islands and along the banks of the Brahmaputra. Also found in SYLHET and the KHASI HILLS.

Tender stems and leaves, which are acid, are eaten cooked with fish.

Fls. 9-10. Fr. 12-1.

17. *Vitis campylecarpa* Kurz. Syn. *Tetrastigma Parkeri* Gagnep. ? Vern. *Tusram-doukha*, Kach.; *Bepui-rhut*, Lush.

A heavy fleshy climber with terete stems; old stems soft wooded with corky, furrowed bark; branches smooth. *Leaves* digitately 3-foliolate, sometimes up to 6-foliolate; common petiole 2-4 in. long, stout. *Leaflets* 9.5-7 by 1.3-4 in., the terminal elliptic, ovate or obovate, lateral narrower, very oblique-sometimes almost falcate, acuminate, distantly cuspidate-serrate, entire towards the base, coriaceous, main lateral nerves 4-8 on either side of the midrib, upper ending in serratures, much arched, blade articulated with the petiolule; petiolule of the terminal leaflet up to 1 in., of the lateral leaflets .3-.75 in. long. *Tendrils* leaf-opposed, stout. *Flowers* 4-merous, diœcious, small in shortly peduncled, dichotomously branched axillary subcorymbose pubescent, compound cymes up to 3 in. long; pedicels stout, very short; buds pubescent, narrowed to a truncate apex from a broad base. *Male flowers* not seen. *Style* 0; stigma large, 4-lobed. *Fruit* about .6 in. long, oblong or ellipsoid, slightly curved, smooth, glossy, usually 1-seeded. *Seed* conforming to fruit if 1-seeded, transversely striate, with a groove on the face and another almost continuous one on the back, the latter with a low broad ridge.

Fairly common in the evergreen types of forests in UPPER ASSAM and SURMA VALLEY, especially in the vicinity of hills.

Fls. 11-12. Fr. 3-5.

I am unable to distinguish this from *Tetrastigma Parkeri* of Gagnepain. ms.

18. *Vitis elongata* Kurz. Syn. *Cissus elongata* Roxb. Vern. *Jermei-sein-iong*, Khasi

A robust climber with round or slightly flattened thick fleshy stem, quite glabrous. *Leaves* digitately 5-foliolate; common petiole 4-7 in. long, stout, swollen and with a callosity at the base. *Leaflets* 6.5-10 by 2.5-5 in., obovate-elliptic or oblong acuminate, outermost oblique, distantly minutely cuspidate-serrate, membranous, quite glabrous; lateral nerves 8-10 on either half, slender, arched, tertiary nerves obscure, distant; base attenuate to the petiolule or cuneate, petiolule margined, .5-1.5 in. long. *Tendrils* leaf-opposed, up to 12 in. in length. *Flowers* 4-merous, 2-sexual, at first in umbels which are borne on 2-chotomously branched cymes. *Style* short, subulate. *Fruit* ellipsoid, 1 in. long, 1-seeded. *Seed* .7 in. long, smooth.

Foot of the KHASI HILLS along the SYLHET border, chiefly along edges of ravines. Also Negheriting, SIBSAGAR-Clarke.
Fls. 5-6. Fr. 7-8.

19. *Vitis planicaulis* Hook. f. Syn. *Vitis neurosa* Kurx. Vern. *Kerkeri-lata*, *Panilata*, *Chepeti-lata*, Ass.; *Turje-doukha*, Cach.; *Rikang-thipu*, Mik.; *Samarang*, Garo.; *Soh-lar-pung*, Khasi; *Charchare-lata*, Nep.

A far-reaching large climber; stem soft, much flattened, especially at the base, wholly glabrous except the inflorescence, *Leaves* digitately penta-foliolate; common petiole 3.5-8 in. long. *Leaflets* 3.5-8 by 1.5-3 in., elliptic or elliptic to oblong-lanceolate, lateral oblique, acuminate, distantly cuspidate-serrate, membranous or sub-coriaceous, glabrous; petiolules .1-.4 in. long. *Tendrils* leaf opposed, simple. *Flowers* greenish-yellow, 4-merous, sweet scented, in umbels which are borne on a pubescent corymbosely or divicately branched congested axillary panicle; peduncles .2-1.5 in. long, stout, branches flattened; pedicels slender, up to .15 in. long; buds pubescent, ovoid, truncate at apex. *Fls.* 4-merous, green; stigma 4-lobed. *Fruit* .6-.8 in. across, globose, succulent, 1-2-seeded. *Seed* .4 by .25 in., whitish, oblong, obovoid, transversely ribbed, with a linear-oblong depressed ridge on the back continuous on the other side but cuneate towards the apex.

Throughout the province chiefly in evergreen forests.
The stem when cut exudes profuse potable sap which the Garos also use to stop bleeding.
Fls. 4-5. Fr. 10-12.

20. *Vitis obovata* Laws. Syn. *Tetrastigma obovatum* Gagnep. Vern. *Taka-pokang*, Miri; *Soh-lar-pung*, Khasi.

A heavy climber with flattened stem. *Leaves* 3-5 foliolate; common petiole 4-6 in. long, covered with curled brown hairs; petiolules .6-1.5 in. long, hairy like the petiole. *Leaflets* 6-8 by 3-5 in., obovate or elliptic, shortly acuminate, subentire or distantly crenate-serrate, membranous, glabrous above, more or less pubescent, especially along the nerves beneath; lateral nerves 7-8 on either half. *Tendrils* opposite leaf or inflorescence,

generally simple. *Inflorescence* shortly peduncled, corymbose, 3-chotomously branched. *Flowers* not seen. *Fruit* somewhat elongately globose, '6-8 in. long, 1-3-seeded. *Seeds* '4-5 in. long, ellipsoid, plano-convex or rounded on the back and wedge-shaped on the face, transversely lined with slender furrows, with a depressed linear oblong ridge on the back which is cuneate towards the apex and continuous on the other side.

Fairly common in evergreen forests in UPPER ASSAM and in shady ravines in the KHASI HILLS; ascending to 4,500 ft., Sadiya, Lokpur, Barpani, closely allied to the last species.

Fr. 10-1.

21. *Vitis capriolata* Don. Syn. *Tetrastigma serrulatum* Planch. Vern. *Mei-soh-mynjiriang*, Khasi; *Jermai-slang-ruin*, *Jermai-sara-boj*, Synt.

A wiry climber wholly glabrous, often trailing on the ground. *Leaves* pedately 5-foliolate; common petiole '5-2.5 in. long. *Leaflets* very variable in size and shape, '6-3 by '5-1.5 in., rhomboid to lanceolate, terminal largest, outermost lateral pair smallest and often oblique, finely often cuspidately-acuminate, sharply cuspidate-serrate, membranous or chartaceous; lateral nerves 5-10 on either half, tertiary nerves almost invisible; lateral petiolules '1-1.5 in. long; ultimate petiolules extremely short or 0. *Stipules* short, persistent. *Tendrils* slender, generally divided near the extremity, often ending in adhesive disks. *Inflorescence* a compound peduncled umbellate cymes generally axillary or at the extremities of short lateral branches, erect or suberect, 2-3 in. long; bracts scarious, conspicuous; primary peduncles '3-1 in. long. *Flowers* 4-merous on slender pedicels, '2-3 in. long. *Petals* somewhat thickened at the apex, into a short horn. *Style* 0; stigma flat, spreading, 4-lobed. *Fruit* globose, about '4 in. across, 2-4-seeded, black when ripe, edible. *Seeds* obovoid, rounded and with a linear tubercle on the back, flattened on the face, transversely wrinkled.

KHASI HILLS up to 6,000 ft., GARO HILLS.

Fl. 8-10. Fr. 12-5. The stem often develops adventitious roots.

22. *Vitis oxyphylla* Wall. Syn. *V. dubia* Laws. *Tetrastigma dubium* Pl. Vern. *Soh-mei-boyet*, Khasi; *Dhoola-dousrem*, Mech.

A slender sinistrorsely-climbing glabrous shrub; older branches striate, warty. *Leaves* pedately 5-foliolate, often 4-3 foliolate by suppression of one or two of the lateral leaflets; common petiole 1-4 in. long, lateral '1-4 in. long. *Leaflets* 2-8 by '7-2.5 in., terminal largest, outermost pair smallest and usually oblique, elliptic to ovate lanceolate or oblanceolate, bluntly long-acuminate, inciso-serrate, membranous or subcoriaceous, glabrous; lateral nerves 7-10 on either half, arched-except the submarginal basal pair, slender. *Tendril* leaf-opposed, slender, simple. *Flowers* 4-merous, polygamo-diœcious, pale-green, pedicelled, in compact,

axillary, peduncled compound corymbose cymes, '7-4 in. long. *Style* columnar, 4 lobed. *Fruit* globose, '3 in. across., black when ripe, 1-2-seeded. *Seeds* rugose.

Not uncommon in shady forests in the hills and their vicinity up to 5,000 ft in the KHASI HILLS (Shillong).

Fls. 2-5. Fr. 3-5.

In the Index Kewensis *V. oxyphylla* Wall has been made synonymous with *V. bracteolata* Wall. As King has pointed out in the Journal of Asiatic Society Vol. LXV page 115 that Lawson's *V. dubia* is exactly the same as *V. oxyphylla* Wall Cat. 6035 which, I have examined at Calcutta herbarium. The latter name must therefore supplant *V. dubia* Laws. *V. bracteolata* Wall Cat. 6025 is an allied but quite a distinct species.

23. *Vitis tenuifolia* W. & A. Syn. *Cayratia tenuifolia* Gagnep.

A graceful slender herbaceous climber, wholly glabrous. *Leaves* pedately 5-foliolate; common petiole 2-4 in. long; lateral petiolules '2-3 in. long, ultimate upto '1 in. long. *Leaflets* 1-3 by '7-2 in., ovate or lanceolate, acute or rounded, sharply cuspidate serrate, membranous. *Tendrils* leaf-opposed, short, slender, simple or forked. *Flowers* 4-merous, 2-sexual, in subcorymbose 2-chotomous, somewhat lax, axillary cymes; peduncles 1-2 in. long, slender, bracteate; pedicels about '2 in. long, filiform. *Style* short; stigma large, peltate. *Fruit* turbinate globose, 1-4-seeded. *Seed* convex and muricate on the back, ridged in the face.

KHASI HILLS (Shillong, 5,000 ft.) NAGA HILLS.

Fls. Cold season. Fr. 6-7.

24. *Vitis lanceolaria* Roxb. Syn. *Tetrastigma lanceolarium* Planch. Vern. *Tudi-ripun-riubi*, Miri.

A heavy climber with flattish woody stem, sometimes with raised transverse bars at intervals; bark rough, brown and often tubercled, branches thick, often muricate with corky warts. *Leaves* pedately 5(-3)-foliolate; common petiole 2-6 in. long, stout; stipules about '5 in. long, oblong-lanceolate, pubescent, deciduous; lateral petiolules '7-1 in., ultimate ones '3-5 in. long, often pubescent. *Leaflets* 3-6 by 1-2-2.5 in., terminal largest, outermost pairs oblique, elliptic, oblanceolate to lanceolate, distantly cuspidate serrate, ovate or shortly acuminate, somewhat fleshy and coriaceous, glabrous; lateral nerves 8-10 on either side of the fleshy midrib, arched, slender; tertiary nerves invisible. *Tendrils* leaf-opposed, simple, stout. *Flowers* yellowish, about '1 in. long, dioecious, in axillary subcorymbosely compound, peduncled, compact pubescent cymes, 2-3.5 in. across; female cymes fewer flowered and usually shorter than male cymes. *Petals* ovate-oblong, pubescent, corniculate at apex. *Style* 0; stigma shortly 4-lobed. *Fruit* '5-7 by '3-7 in., globose, smooth. *Seed* 1-2, with ruminated albumen, transversely wrinkled, back rounded with an elongate linear tubercle and face with a shallow forked groove.

Common in the FRONTIER DISTRICT, LAKHIMPUR, NAGA HILLS, SIBSAGAR and NOWGONG; also occurs in evergreen type of forests in other DISTRICTS of both VALLEYS, ascending to about 3000 ft. in the hills.

The ripe fruit is eaten by the Meches of Goalpara, cooked with fish.
Fls. 2-4. Fr. 5-9.

25. *Vitis rumicisperma* Laws.

A large climber with cylindrical stem covered with corky warts or tubercles. *Leaves* pedately 5(-3)-foliolate; common petiole 1.5-4 in. long; lateral petiolules .3-5 in., ultimate ones 0-1 in. long. *Leaflets* 2-5 by 7-2 in., terminal largest, outermost pair usually oblique and smallest, obovate to oblanceolate, usually finely acuminate, sharply serrate, coriaceous, glabrous; main lateral nerves about 12 on either side of the midrib, somewhat transverse. *Flowers* small, 4-merous, polygamo-dioecious, in repeatedly much branched pubescent, peduncled, axillary and terminal, subcorymbose, spreading compound cymes, usually 3-5 in. long; primary peduncles upto 2 in. long, appearing longer on account of suppression of leaves at the base; pedicels about .1 in. long. *Style* short; stigma 4-cleft. *Fruit* 2-3 in. diam., usually 4-seeded, turbinate-globose, black when ripe, with a ring often with minute tubercles (indicating the disk?) below the middle, by which character as well as by its seeds this species is very readily distinguished from all its near allies. *Seeds* 1-4, about .3 in. long, triangular obovate in outline, rugose across the sharp margins, back with an oblong tubercle in a shallow groove, face wedge-shaped, sharply ridged and with two fine grooves radiating at an angle on either side of the ridge.

KHASI and JAINTIA HILLS chiefly along the south face, 3,500 ft.

The ripe fruit is edible.

Fls. 5-6. Fr. 7-9.

Vitis Hookeri Laws.—A stout glabrous climber with cylindrical stem; branchlets glaucous, often warty. *Leaves* pedately 5-3-foliolate; common petiole 3-5 in. long, thickened and with a callosity at the base; lateral petiolules .8-1 in. and ultimate petiolules .4-6 in. long, stout, channelled. *Leaflets* 5-7 by 1.5-3.5 in., ovate, elliptic or oblong, bluntly acuminate, distantly crenate or sub-entire, coriaceous, glabrous; lateral nerves 6-10 on either half, slender, tertiary nerves indistinct. *Tendrils* leaf-opposed, simple, 8-10 in. long. *Flowers* 4-merous, in broad axillary corymbose cymes, on peduncles 3-5 in. long. *Fruit* 1 in. across, pulpy, 2-seeded. *Seeds* about .5 in. long, obovoid.

Reported as occurring in the plains of ASSAM and between 1-4000 ft. in the KHASI HILLS. There are however no specimens in Calcutta Herbarium from our area.

Fls. 9-10. Fr. Cold season (?)

26. *Vitis japonica* Thunb. *Incl.* *Vitis mollis* Wall; *Cayratia japonica* Gagnep.

A slender climber, branchlets, inflorescence and leaves specially on the undersurface pubescent or hairy. *Leaves* pedately 5-foliolate; common petiole 7-2.5 in. long; terminal leaflet 1.4-3 by 7-1.3 in., lateral smaller and more or less oblique, lanceolate, elliptic-lanceolate or oblong-obovate, acute or acuminate, rarely subacute, coarsely crenate-serrate; lateral nerves 4-7; tendrils leaf-opposed, at first slender, stouter with age, simple or forked. *Flowers* small, 2-sexual, in compound, subcorymbose cymes, peduncles 1.5-4.5 in. long; pedicels slender, .1-1.5 in. long. *Calyx*

nearly truncate, pubescent outside. *Petals* 4, pubescent, specially towards the apex; disk lobes adnate to the ovary. *Ovary* 2-celled with 2-collateral ovules in each cell; style short, subulate. *Berries* obovoid, 2-3 in. long. *Seeds* trigonous, face sharply ridged, sides more or less excavate, back convex, rugose, marked with an elongated tubercle, and few subtransverse wrinkles.

CACHAR HILLS, S. LUSHAI HILLS, KHASI HILLS—Walong, Gauhati—*King's Collector*! **Manipore**, ascending to 4,000 ft. in the Hills.

Fls. 4. Fr. 5-6.

Closely resembles *V. tenuifolia* from which it can be readily distinguished by its hairiness. The terminal leaflet in some forms attain 4.5 by 2.5 in.

27. *Vitis pedata* Vahl. Syn. *Cayratia pedata* Juss. Vern. *Tusamphor-doukha*, Kach.; *Uri-ising-ihokphi*, Manip. (?); *Goalia-lata*, Beng.

A woody climber with cylindrical stem and striate branches. *Leaves* usually pedately 5-7-foliolate; common petiole 2-5 in. long, stout, fleshy, striate; lateral petiolules up to 1 in. long, ultimate up to .5 in., in length. *Leaflets* 3-8 by 1-3.5 in., elliptic to oblong-lanceolate, lateral very oblique, acuminate, crenate-serrate, membranous, often softly pubescent when young. *Tendrils* leaf-opposed, slender, repeatedly forked. *Flowers* 2-sexual, usually 4-merous, very small, greenish, pubescent, in axillary cyme-bearing corymbs about as long as the petioles; pedicels capillary. *Fruit* 3-4 in. across, depressed-globose, 4-seeded. *Seeds* small, hemispherical and concave, with a thin membrane on the concave side.

Fairly common in the plains and up to about 2,000 ft. in the hills.

The leaves are often used as a domestic remedy on account of their astringent properties.

Fls. 5-8. Fr. Cold season.

28. *Vitis rubifolia* Wall.

A large climber with slender 4-angular branches; young shoots rusty-pubescent. *Leaves* simply pinnate, 7-11-foliolate; rachis 5-9 in. long, pubescent. *Leaflets* opposite, 2-3.5 by 1-2 in., ovate to lanceolate with rounded or cordate base, finely acuminate, coarsely but regularly dentate-serrate, membranous, glabrous and green above, reddish and puberulous beneath; lateral nerves about 7 on either side of the midrib, opposite or sub-opposite, each usually terminating in a serrature on the margin; petiolules .05 in. long, pubescent. *Tendrils* forked, often wanting. *Flowers* small, greenish, in subcorymbosely arranged umbellate cymes, 5-7 in. long. *Fruit* depressed, globose, about 2 in. across, red, turning black when fully ripe. *Seeds* small, obovoid, back with a spatulate tubercle, margins transversely rugose, face wedge-shaped.

Joboka and adjoining parts in SIBSAGAR. Prains Collector! also southern faces of the KHASI HILLS, e.g.; near Jaintiapur; NAGA HILLS, possibly in many other similar localities.

Fls. 8-10. Fr. 10-1.

2. LEEA Linn.

Stout fleshy erect herbs, shrubs or small trees, usually with a large pith; branches furrowed or striate. *Leaves* alternate, usually large, simple or more commonly variously pinnate; petiole sheathing. *Tendrils* 0. *Inflorescence* subterminal or leaf-opposed. *Flowers* small, red, yellow, white or greenish, in corymbose cymes. *Calyx* 5-lobed. *Petals* 5, connate at the base and adnate to the staminal tube, induplicate-valvate and hooded in bud, revolute when fully open. *Stamens* 5, united at the base into an entire or 5-cleft staminal-tube; free ends of the filaments short, reflexed; anthers introrse, free or more or less connate in bud, dehiscing longitudinally. *Ovary* inserted at the base of the staminal tube, 3-6-celled with one ovule in each cell; style short. *Fruit* 3-6-celled, depressed-globose, lobed. *Seeds* wedge-shaped with testa folded and intruded into the albumen.

- I. Petals and inflorescence red :—
 - A. Leaves simply pinnate, petiole-winged :—
 - Leaflets sessile. .. 1. *L. alata*.
 - B. Leaves 2-pinnate, petiole not winged :—
 - Leaflets sessile. .. 2. *L. sp.*
 - Leaflets petioluled. .. 3. *L. acuminata*.
- II. Petals white or greenish; inflorescence not red :—
 - A. Herbaceous :—
 - Ordinary leaves simple*, very large. .. 4. *L. macrophylla*.
 - B. Undershrubs; secondary nerves 1 to each tooth :—
 1. Leaves usually 3-foliolate. .. 5. *L. trifoliata*.
 2. Leaves variously pinnate :—
 - a. Stem and peduncle with crisped wings; secondary nerves continuous, each terminating in a serrature. .. 6. *L. crispa*.
 - b. Stem not winged; secondary nerves forked at the extremity, each fork terminating in a serrature. .. 7. *L. aspera*.
 - C. Shrubs or small trees, secondary nerves several to each tooth :—
 1. Leaflets glabrous, acute at the base :—
 - Small tree often stilted on aerial roots; leaflets oblong. .. 8. *L. umbraculifera*.
 - Semi-herbaceous shrub; stem 'not stilted; leaflets more or less ovate. .. 9. *L. sambucina*.
 2. Leaflets hairy, rounded or subcordate at base :—
 - a. Leaflets with peltate scales underneath. .. 10. *L. aquata*.
 - b. Leaflets without peltate scales :—
 - Inflorescence with numerous conspicuous persistent bracts. .. 11. *L. bracteata*.
 - Bracts not persistent or conspicuous .. 12. *L. robusta*.

1. *Leea alata* Edgew. Vern. *Bon-ou*, Ass.

A somewhat stiff undershrub with annual stem up to 5 ft. in height, glabrous but covered with elevated dots. *Leaves* simply

* Rarely one or two upper leaves are pinnate, the leaflets being very small.

impari-pinnate; rachis margined; common petiole 1-2.5 in. long, grooved, winged (not crisped) reddish; stipules deciduous. *Leaflets* 5-9, usually 5, sometimes 3, sessile or very shortly petioluled, 6-12 by 2-3 in., oblong, oblong-lanceolate, generally acute, sharply serrate, coriaceous, glabrous; lateral nerves 10-14 on either half, strong, almost straight, very slanting, tertiary nerves numerous, parallel and transverse; base more or less rounded. *Inflorescence* corymbosely cymose, pubescent, reddish. *Peduncles* 2-7 in. long, subterminal, furrowed; pedicels very short. *Flowers* red, small, numerous. *Anthers* connate. *Fruit* about .5 in. across, red, turning bluish-purple in ripening, succulent.

LAKHIMPUR DISTRICT, Mann! Probably SIBSAGAR and DARRANG, KAMRUP and low elevations in KHASI HILLS, NAGA HILLS.

The stem dies back annually to a woody base.

Fls. 7-8. Fr. 9-11.

2. *Leea* sp. probably *L. Wightii*. C. B. Clarke. in Trimen's Journal of Botany 1831, p. 105.

An undershrub up to about 6 ft. in height. *Leaves* 2-pinnate; common petiole and rachis terete, not winged, glabrate; pinnae generally 4. *Leaflets* 4-6 by 1.2-1.6 in., sessile, lanceolate or oblong-lanceolate, serrate, sharply acuminate, membranous, slightly hispid; lateral nerves 8-12 on either half, generally opposite, slender, arched, tertiaries transverse, very fine, rather irregular, subparallel. *Inflorescence* and *Flowers* coral-red, flower-buds globose. *Fruit* not seen.

Guma Reserve-GOALPARA, sheet No. 7560. Material incomplete for satisfactory determination.

3. *Leea acuminata* Wall. Vern. *Bujiou*, *Kath-thengia*, Ass.; *Gangma-Sangop*, *Gangma-ehi*, *Gangma-jachheng*, Garo; *Dueng-lang-karmun-kynthei*, Khasi; *Asra-jola*, Mech; *Uichokpa-khungru*, Tipp.; *Phuphaira*, Sylh.; *Charai-thengia*, Ass. (Kam.) also Mikir.

A robust herbaceous shrub up to 15 ft. or more in height, bifariously branched; stem terete, annulate at the nodes, up to 3 in. diam. at base, with large pith and often with large thick aerial roots; branches striated. *Leaves* very large, bifarious, 2-pinnate; pinnae usually 2-pair, 3-7-foliolate, rachis terete, glabrous; stipules connate, .7-1.5 in., adnate to the petiole and auricled at the base. *Leaflets* 4-9 by 1.5-3.5 in., terminal leaflet of each pinna usually largest, ovate, elliptic-lanceolate or oblong-lanceolate, acuminate, serrate, coriaceous when fully mature, glabrous, shining on both surfaces, pink when tender, turning yellow and ultimately red before falling; lateral nerves 8-10 pairs, opposite, much arched; tertiary nerves transverse, subparallel; petiolules usually .2-.4 in., sometimes up to .7 in. long, *Corymbs* pubescent or puberulous, coral red; peduncles usually 2.5-4 in. long, leaf-opposed; pedicels very short; buds globose.

Flowers crowded, coral red, about 1 in. across. *Fruit* 2.5-3 in. diam., orange red, supported by the persistent calyx.

Fairly common in grass-lands and glades throughout the PROVINCE, ascending up to 2,500 ft. in the KHASI HILLS.

The stems are used as substitutes for bamboos in building temporary huts in forests where no bamboo grows.

Fls. 5-8. Fr. 9-2.

4. *Leea macrophylla* Roxb. Vern. *Pharun-barne*, Khasi; *Dholsamudra*, Beng.

A perennial herb with switchy annual shoots 3-5 ft. long which generally die back in March-April to be replaced by new ones in May-June; stem deeply sulcate. *Leaves* usually up to 3 only, almost always simple, 9-20 by 8-16 in., ovate-cordate, acute, dentate-serrate, coriaceous, glabrous and dark-green above, greyish puberulous or pubescent beneath; midrib sharply keeled; lateral nerves about 9-12 on either half, usually opposite, almost straight, each giving off 1-6 branches terminating in teeth on the margin; petiole 2-3.5 in. long, stout, channelled halfway from beneath with large adnate stipules. *Flowers* polygamous, white, small, males usually in small sessile or shortly peduncled corymbs from the base of the puberulous peduncle of the female corymbs which are 8-12 in. long. *Staminal tube* entire or nearly so. *Fruit* depressed-globose, 2.5-3.3 in. diam., black when ripe.

Only found so far in the KAMRUP and KHASI HILLS Districts, chiefly in the neighbourhood of Barnihat.

The ripe fruit is edible. The root is reported to be a remedy for ring-worm and guinea-worm and is also applied as poultice on obstinate sores and on sprains.

Fls. 8-10. Fr. 10-5.

5. *Leea trifoliata* Laws.

A weak herbaceous plant with swollen joints up to 3 ft. in height. *Leaves* usually* 3-foliolate; petiole sheathed at the base, winged above. *Leaflets* 3-6 by 1-3 in., elliptic-oblong or obovate, rather abruptly acuminate, cuspidate serrate or serrulate, membranous, slightly pubescent along the nerves, especially when young; main lateral nerves about 10 on either side of the midrib, slightly arched; lateral petiolules 2-4 in. long, terminal 8-1.5 in. long. *Cymes* small. *Antthers* distinct. *Fruit* dry, black when ripe.

Foot of the KHASI HILLS in KAMRUP, NAGA HILLS.

Fls. 5-6. Fr. 7-8

6. *Leea crispa* Willd. Vern. *Gangma-chhangoppa*, *Mangkhrom*, Garo; *Soh-phyrnou-nar*, Khasi; *Ban-chalta*, Beng.

A gregarious undershrub, 3-4 ft. high, which grows annually from a perennial root-stock, easily recognised by crisped wings on the branches and leaf-rachis, the last two sulcate between the wings; young parts pubescent. *Leaves* pinnately 3-5-foliolate;

* Sometimes a pair of much smaller leaflets are seen about the middle of the petiole, e. g., my sheet No. 5449.

common petiole short, stout. *Leaflets* 4-9 by 1.5-3.5 in., elliptic, obovate, to ovate-oblong or oblong-lanceolate, acute or shortly acuminate, coarsely serrate, generally rounded at the base, coriaceous, subglabrous, turning red before dying; lateral nerves about 18 on either side of the midrib, straight, parallel, minutely strigose beneath; tertiary nerves very fine, transverse, parallel, glabrous; petiolules 3-5 in. long. *Corymbs* shortly peduncled, 1-2 in. across. *Flowers* pale-yellow; pedicels short; bracts small, persistent. *Anthers* distinct. *Fruit* .3 in. across, broader than long, glabrous, steel-grey when ripe, 5-6-seeded.

Very common in grass-lands, especially in the Sal-bearing tracts of the PROVINCE and up to 4,000 ft. in the KHASI HILLS. It helps the regeneration of Sal by ousting grass and preparing the soil for germination of seed.

Fls. 7-8. Fr. 10-12.

7. *Leea aspera* Edgew. Vern. *Soh-phyrnou*, Khasi; *Rahakhani-gangma*, Garo.

An annual but semi-woody plant sometimes attaining 15-20 ft. in height, often tufted. *Stem* striated and with longitudinal grey streaks; pith large. *Leaves* usually 2-pinnate, sometimes 1 or 3-pinnate; rachis glabrous. *Leaflets* 3-6 by 2-3.5 in., elliptic, oblong or ovate, finely caudate, rounded or subcordate at the base, strongly and often cuspidately serrate, membranous or sub-coriaceous, punctate, harsh above, pubescent on the nerves beneath; lateral nerves 15-18 on either side of the midrib, mostly opposite, lowest pairs basal, almost straight, parallel, tertiary nerves very fine, close, parallel, lateral petiolules 3-6 in. long. *Cymes* axillary, corymbose, 2-4 in. long; often trichotomously branched; branches compressed. *Flowers* .2 in. across, light-green, slightly scented; bracts small, persistent. *Calyx-teeth* acute. *Petals* lanceolate. *Berries* .3 in. across, depressed-globose, 5-seeded, slaty-green, turning black when fully ripe.

Fairly common in deciduous forests and grass-lands, especially in LOWER ASSAM and the HILLS up to 4,000 ft.

Fls. 6-8. Fr. 10-12.

8. *Leea umbraculifera* C. B. Clarke. Vern. *Ahina*, Ass. (Darr.); *Gach-gangma*, Ass. (Kam.); *Hupai-ura*, Sylh.; *Rakkibaing-assing*, Miri & Abor; *Pandausa-baphang*, Kach.; *Dieng-shong-wiang-synrang*. *Dieng-shong-rieng-masi*, *Dieng-song-wi-ang*, Khasi; *Choplipli*, *Soplipli*, *Nampiru-chin*, Mik.; *Demboranglang-changne*, Duft.; *Thi-phak-Khronng-bol*, *Gangma-jachin*, Garo; *Asra-jola*, Mech.

A small tree attaining 50 ft. in height; stem fluted at base, often stilted on crown of thick aerial roots; bark grey or brown and somewhat rough outside, red inside. *Leaves* 2-3-pinnate; common petiole purple, amplexicaul at the base, rachis channelled, glabrous, purple at points of insertion of the pinnae. *Leaflets* 3-8 by .8-2 in., oblong-lanceolate or oblong, strongly serrate, caudate-acuminate, rounded or subacute at the base, coriaceous,

quite glabrous, shining underneath, variegated with red brown and green before falling; lateral nerves 10-15 on either side of the midrib, generally opposite, much arched, tertiary nerves very fine, transverse, parallel; petiolules 2-2 in. long, rather slender. *Inflorescence* 4-8 in. long, terminal or subterminal, corymbose with puberulous ultimately glabrescent branches; peduncles ordinarily up to 4 in. long; pedicels up to 1 in. long. *Flowers* greenish-white, 2-25 in. across. *Calyx* green, turbinate, lobes 5, rounded, persistent. *Petals* light-green, 16 by .08 in. lanceolate, spreading or recurved. *Disk* fleshy, light yellow, urceolate. *Anthers* sessile, cohering by their lower end, introrse; connective white. *Fruit* 25-3 in. across, depressed-globose, rather obscurely 3-6-lobed.

Common throughout the PROVINCE, especially in evergreen type of forest.

Wood reddish-brown, hard and compact, weighing about 48 lbs. per c. ft.; medullary rays some very broad, others finer, not very close, pores large but scanty; annual rings distinct, liable to crack but takes a good polish, and quite ornamental in radial section.

Figs. 7-11. Fr. 12-2.

9. *Leea sambucina* Willd. Vern. *Kukurathengia*, Ass. (Lakh. & Sib.); *Dibadiang-asung*, Miri; *Riu-khong-pieng*, Khasi. Also most of the names applied to *L. umbraculifera*.

A semi-herbaceous shrub up to 15 ft. in height and 3-4 in. in diam., at base. *Leaves* 2-3 pinnate, rachis stout, glabrous. *Leaflets* 3-8 by 8-3.5 in., oblong, oblong to ovate or elliptic-lanceolate, sharply acuminate, glabrous, coriaceous when mature; lateral nerves 7-12 on either half, arcuate, forked near the margin, raised beneath, tertiaries fine, lateral petiolules 2-5 in. long, terminal up to 1.5 in. long. *Flowers* greenish white, 25-3 in. across in much branched (often from near the base) compact puberulous, subterminal corymbs up to about 4 in. long; peduncles up to 2 in. long. *Petals* lanceolate-oblong, spreading; anthers cohering at the base. *Berry* depressed, globose, 25-3 in. across, obscurely 3-6 lobed, 3-6 seeded.

Common in evergreen forests.

The ripe fruit is said to be edible. It is very apt to be mistaken for young stages of *L. umbraculifera* from which it differs by its habit, somewhat broader and fewer nerved leaflets, shorter and stouter peduncles, broader panicles and larger flower buds.

Firs. rainy season. Fr. winter.

10. *Leea æquata* Linn. Vern. *Dieng-soh-phyrru-iong*, Khasi (Kam. side).

A semi-herbaceous plant 8-10 ft. high, easily distinguished from its cogeners by its harsh feel and by the peltate glands on the undersurface of its leaves; young shoots hispid pubescent. *Leaves* 1-3-pinnate, usually 2-pinnate; rachis terete, hirsute. *Leaflets* 3-9 by 1-2.5 in., oblong-lanceolate or lanceolate, sharply serrate, caudate, acuminate, more or less rounded at the base, membranous, hispid with scattered grey hairs above, hirsute along the nerves and with scattered round brown peltate glands

beneath; lateral nerves 8-18 on either side of the midrib, slender, arched, tertiaries sub-parallel, invisible on the upper surface; lateral petiolules 1.5-5 in., terminal 1-1.5 in. long, hirsute. *Inflorescence* subterminal or leaf-opposed, 3-4 in. long and as broad, glandular-hairy; peduncle often branched from near the base. *Berries* depressed-globose, .25-.3 in. diam., 3-6-seeded, turning red and finally black in ripening.

Apparently not very common. Foot of the KHASI HILLS on the KAMRUP side.

Fls. 6-7. Fr. 10-12.

11. *Leea bracteata* C. B. Clarke. Vern. *Kumtin-toi*, Lush.; *Lang-kurnu*, Khasi.

A shrub up to 16 ft. in height and 2.5 in. in diam. at base; stem often rooting from the internodes; young shoots rusty pubescent. *Leaves* pinnate or bipinnate; rachis more or less pubescent; common petiole sheathing at the base and winged from there for a length of 2.5-4 in. *Leaflets* 9-15 by 2.5-6 in., ovate, elliptic or oblong lanceolate, crenate-serrate, caudate acuminate, rounded or subacute at the base, membranous or chartaceous; glabrous and green above, pubescent and of a coppery-brown colour underneath; lateral nerves 15-20 on either half, mostly opposite, slightly arched, prominent beneath; tertiary nerves transverse, wavy, very fine; lateral petiolules .2-4 in. long, stout, pubescent. *Inflorescence* 3-4.5 in. long and about as broad, congested, with bright red pubescent branches and numerous ovate or lanceolate subpersistent bracts .2-6 in. long. *Berries* .3-4 in. diam., depressed-globose, 1-5-seeded, black when ripe.

KHASI, NAGA and LUSHAI HILLS up to 4,000 ft., generally in shady forests and ravines.

Wood fairly compact and heavy, resembling *L. umbraculifera* in structure.

Fls. 5-7. Fr. 10-12.

12. *Leea robusta* Roxb. Vern. *Koulkar*, Lushai.

A semi-herbaceous shrub up to 10 ft. in height; branches rusty-tomentose. *Leaves* 2-3-pinnate; rachis rusty-tomentose. *Leaflets* 8-12 by 2.5-3.5 in., lanceolate, or oblong-lanceolate, caudate-acuminate, finely serrate, rounded or subcordate at the base, membranous, glabrous but sub-rugose above, softly rusty-pubescent beneath; lateral nerves 14-18 on either half, generally opposite, slender, arched, tertiary nerves transverse, wavy, about .06 in. apart, parallel. *Peduncle* and branches of inflorescence rusty-villous, bracts deciduous, anthers slightly united in bud. *Flowers* green; staminal tube white. *Berries* about .33 in. across, purple-black when fully ripe; depressed, globose, 4-6 seeded.

KHASI HILLS, 3-4,000 ft., not very common.

Fls. 7-8. Fr. 10-12.

FAM. 43. STAPHYLEACEÆ.

Trees or shrubs. *Leaves* alternate or (in the case of our only genus *Turpinia*) opposite. *Flowers* 2-sexual, regular, panicle. *Calyx* imbricate, 5-partite, hypogynous. *Petals* 5, imbricate. *Disk* complete, lobed. *Stamens* 5, inserted outside the disk and opposite the calyx-lobes; anthers introrse. *Ovary* of three carpels, free or (in our genus) combined; ovules 2 or more in each carpel; styles 3, short. *Fruit* a berry or capsule; seeds one or many in each cell, albuminous; embryo straight.

1. TURPINIA Vent.

Trees or shrubs. *Leaves* opposite, imparipinnate, stipulate. *Leaflets* opposite, stipellate, serrulate, generally shining, often more or less oblique at the base. *Panicles* terminal, often running down to the axils of the upper leaves, sometimes wholly axillary. *Flowers* whitish. *Filaments* flattened; anthers small. *Ovary* sessile, 3-celled. *Fruit* a 3-lobed and 3-celled berry. *Seeds* angular; testa shining.

Middle-sized tree. Leaflets generally 7. Panicles

large, mostly terminal. Fruit over 1 in. in diam.

Large shrub or small tree. Leaflets generally 5.

Panicles small, generally axillary. Fruit scarcely

½ in. in diam.

.. 1. *T. pomifera*.

.. 2. *T. nepalensis*.

1. *Turpinia pomifera* DC. Vern. *Pani-leteku*, Ass. (Lakh.); *Bon-keseru*, Ass. (Sib.); *Gobar-kihutla*, Ass. (Darr.); *Mota-amari*, Ass. (Kam.); *Tukku-assing*, Abor; *Sidumbulli-assing*, Miri; *Thekjoai*, *Thekejoy*, *Khrang-arong*, Mik; *Piyu-nekphi*, *Takre-changne*, Duff. *Dieng-iong*, *Dieng-soh-sang-kei*, *Dieng-soh-long-anthri*, Khasi; *Thaisram-phang*, Kach.; *Kothamari*, Garo (Dambu); *Bol-dikim*; *Kulamari*, *Kothamari*, *Gongmajaching*, Garo; *Kala-dingart*, Mech.

A rather handsome small or middle-sized tree, sometimes attaining as much as 9 ft. in girth, generally with a gregarious tendency; crown narrow and conical until mature. *Bark* grey or brown, fairly smooth on young trees, 12-25 in. thick, horizontally wrinkled and vertically furrowed, whitish or dun-brown inside with strands of deeper brown or amber. *Leaves* usually 10-20 in. long, opposite, imparipinnate, wholly glabrous; rachis terete; stipules interpetiolar, triangular, caducous. *Leaflets* generally 7, often 5, rarely 9 or 3, opposite, 3-8 by 1-3 in., oblong-elliptic or ovate, acuminate, serrulate, acute or slightly rounded and usually more or less oblique at the base, coriaceous, glossy green above, pale beneath; lateral nerves 6-8 on either half, much arched, tertiary nerves fine, irregularly reticulate;

lateral petiolules 1-4 in. long, terminal 1-2 in. long; stipules subulate, caducous. *Panicles* up to 12 in. or more in length when terminal, 3-6 in. long when axillary, corymbosely much branched; pedicels short. *Flowers* about 2 in. across, minutely bracteolate. *Calyx lobes* unequal, ovate or elliptic oblong, deciduous, ciliolate, 1-15 in., obovate-oblong or oblong; styles 3, more or less connate. *Fruit* nut-like, 7-15 in. across, globose. *Seeds* without aril; albumen fleshy; embryo straight.

Ubiquitous in evergreen types of plains forest throughout the province, especially in damp localities, ascending to 3,000 ft. in the hills.

The leaves are used for cattle fodder. Wood whitish, soft, even-grained, weighing 30-35 lbs. per cft.,—not used except as firewood but might be found suitable for carved toys and cooper's articles.

Flrs. 2-3. Fr. 4-5.

2. *Turpinia nepalensis* Wall. Vern. *Dieng-ja-rasi*, Synt., *Dieng-ja-arthri*, Khasi.

Generally only a shrub, scarcely exceeding 20 ft. in height; bark grey, corky outside, 15 in. thick; light-brown inside with streaks of lighter tissue. *Leaves* usually 5-12 in. long. *Leaflets* scarcely more than 5, 2-5 by 8-15 in., elliptic, ovate or oblong, caudate-acuminate, closely serrulate, coriaceous, glabrous, concolor on both surfaces, not so shining above as in *T. pomifera*; lateral nerves 4-7, arched, very slender; base always acute, often cuneate. *Inflorescence* generally axillary, 4-7 in. long. *Flowers* not seen. *Fruit* globose, up to 3 in. across, succulent when ripe, sweetish.

Above 4,000 ft., in the KHASI HILLS and possibly also the MIKIR HILLS. Mawmluh near Cherrapunji, Kyelong Rock, Mawsynrang etc.

Fr. 10-12.

This is undoubtedly a distinct species. The leaves and fruit are quite different, also the flowering and fruiting seasons.

FAM. 44. ACERACEÆ.

Trees or erect shrubs. *Leaves* opposite, simple, undivided or lobed; stipules 0. *Flowers* regular, polygamous. *Sepals* and *petals* isomerous, the latter sometimes wanting. *Disk* generally complete and annular or 0. *Stamens* 4-10, inserted outside or upon, very rarely inside the disk; filaments free. *Ovary* of 2 carpels, each 1-2 ovuled. *Fruit* of two indehiscent samaras; *Seeds* exalbuminous.

1. ACER Linn.

Generally the characters of the Family. *Leaves* (in the Assam species) undivided or 3-7 lobed. *Flowers* in terminal or axillary racemes or corymbs. *Calyx* usually 5-lobed, deciduous. *Petals*]

as many as the calyx-lobes, sometimes 0. *Disk* thick, annular or cup-shaped, glabrous; margin lobed. *Stamens* generally 8, inserted on the disk; filaments dimorphous being usually longer in the male than in the hermaphrodite flowers. *Ovary* usually 2-lobed, 2-celled, laterally compressed; style deeply 2-fid; ovules 2 in each cell. *Fruit* a double samara, indehiscent; wings large, shaped more or less like the blade of a *khukri* (culturate), membranous, thickened at the back; cotyledons irregularly folded.

Petiole usually exceeding 1 in. in length:—

Leaves pale beneath; cymes pubescent.

.. 1. *A. oblongum*.

Leaves silvery-white beneath; cymes glabrous.

.. 2. *A. niveum*.

Petiole usually less than 1 in. in length:—

Leaves green beneath; cymes glabrous.

.. 3. *A. laevigatum*.

1. *Acer oblongum* Wall. Vern. *Dieng-soh-khru*, Khasi; *Dieng-ialeh*, Synt.

A middle-sized deciduous tree, often irregularly buttressed at the base; branches lenticelled; bark greenish-grey or brown outside, with short raised horizontal bars and shallow longitudinally reticulate furrows peeling in irregular thick flakes in older trees, 2-4 in. thick, inside light pink, in very thin concentric layers. *Leaves* often ternate on young stems, 2.5-6 by 7-2 in., oblong or ovate-lanceolate, acuminate, entire, chartaceous, glaucous beneath; lateral nerves 6-8 pairs; base sub-acute or rounded. 3-nerved; petiole 7-4 in. long, slender, terete, coral-red or green. *Flowers* 5-merous in terminal or leaf-bearing lateral corymbose panicles, 3-5 in. long, pedicels and calyx hairy. *Sepals* and *petals* 1 in. long, linear-oblong. *Stamens* 8, exserted; filaments glabrous. *Ovary* hairy. *Fruit* glabrous; nuts more or less angular; wings 1 by 5 in., contracted at the base, divergent but often overlapping by the inner edges, closely veined.

The KHASI & JAINTHIA and NORTH CACHAR HILLS between 2,000 and 4500 ft., not uncommon.

Wood light reddish-brown, moderately hard, close-grained, medullary rays fine; weighing 45 lbs. per cft., suitable for agricultural implements and for turning into cups and bowls.

Flrs. Rainy season (?) Fr. 12-2.

2. *Acer niveum* Bl. Vern. *Mota-bhe*, Ass. (Lakh); *Nabar*, Kuki.

A shade-enduring tree, often attaining very large size; bark brownish-grey, shallowly reticulately fissured, dun-brown inside, reddish-brown with yellow reticulations underneath the corky layer. *Leaves* opposite, sometimes ternate or alternate, 4-9 by 1.5-3 in., oblong or elliptic acuminate, quite entire, coriaceous, dark-green and glabrous above, glabrescent and silvery-grey beneath; lateral nerves about 8 on either half often with shorter intermediate ones, conspicuous underneath, tertiary nerves strongly reticulate; base acute or slightly rounded; petioles 1-3 in. long, slightly swollen at the upper extremity. *Flowers* small, in racemose glabrous corymbs. *Stamens* 6-8, glabrous.

Fruit glabrous; cells not angular; wings about 1 in. long, constricted near the base, divergent, much veined.

Only found in the LAKHIMPUR DISTRICT along the NAGA HILLS boundary, in the neighbourhood of Jeypur and in CACHAR on the Bhuban Hills.

3. *Acer lævigatum* Wall. Vern. *Dieng-than*, *Dieng-soh-tyrkhum*, *Dieng-tyrthia-iong*, Khasi; *Dieng-ja-ryngam*, *Dieng-soh-tang-hi*, Synt.; *Thing-khim*, Lush.

A middle-sized deciduous tree with dark greenish-grey bark on trunks and larger branches and smooth green bark on branchlets; inside creamy-white to pale-yellow, granular, speckled with brown spots, somewhat bitter in taste. *Leaves* 2-6 by 1-2 in., ovate or oblong-lanceolate, acuminate, serrulate when young, undulate, glabrous but often pilose along the mid-rib and with tufts of silky hairs in the axils of the nerves beneath, chartaceous, turning pink before falling; main lateral nerves 6-9 on either side of the midrib, arched; nervules very closely reticulate; petiole .25-.75 in. long, finely channelled above. *Racemes* 3-5 in. long, lax, with very slender ramifications. *Sepals* 5, ovate or lanceolate. *Petals* 5, clawed, white, about .12 in. long. *Stamens* 5-8, glabrous, longer than the petals. *Ovary* hairy. *Fruit* glabrous; nuts elliptical, almost terete, reticulate; wings .7-1 in. long, divergent, tinged with red until mature, back fairly straight.

KHASI & JAINTIA HILLS, 3-6000 ft. Cherrapunji, Soharim, Jawai, Shampung, etc. not common but with a gregarious tendency where it occurs.

Wood white, hard and close-grained, weighing about 43 lbs. per c. ft., capable of being used as planks and scantlings.

Flrs. 3-4. Fr. 8-10.

FAM. 45. SAPINDACEÆ.

Trees, shrubs or rarely climbing herbs. *Leaves* alternate, pinnate or rarely 1-3-foliate, (opposite and digitate in *Æsculus*), exstipulate. *Flowers* usually polygamous, generally more or less irregular. *Calyx* 4-5-lobed or of 4-5 sepals, usually imbricate, rarely valvate. *Petals* 4-5 or 0, often with scales or tufts of hairs at the base within. *Disk* annular or unilateral, often lobed, sometimes wanting in male flowers. *Stamens* 4-8, rarely 10, generally inserted inside the disk. *Ovary* 1-4, usually 3-celled, often 3-lobed; ovule generally 1, sometimes 2 in each cell. *Fruit* capsular or drupaceous, sometimes lobed. *Seeds* often arillate with a large hilum; albumen 0; cotyledons curved or convolute.

I. Climbing herbs with tendrils and biterate leaves; unilateral disk and capsular fruit.

.. 1. *Cardiospermum*.

II. Erect trees or shrubs:—

A. Leaves opposite, digitate; fruit a capsule.

.. 2. *Æsculus*.

B. Leaves alternate, pinnate or 1-3-foliolate :—

1. Flowers irregular, disk unilateral or oblique :—

Fruit indehiscent, deeply divided into 3-1 lobes :—

Lobes of fruit globose :—

Leaves 3-1-foliolate. ...

Leaves pinnate. ...

Lobes of fruit oblong. ...

2. Flowers more or less regular ; disk annular :—

a. Fruit capsular :—

Capsule not inflated ; ovules solitary. ...

Capsule inflated ; ovules usually 2 in each cell. ...

b. Fruit indehiscent :—

i. Fruit not divided :—

Calyx widely imbricated, ...

petals 5-4, fruit trigonous. ...

Calyx subvalvate ; petals 0 ; fruit ovoid. ...

ii. Fruit divided into 3-1-lobes :—

Fruit not mucronated or tubercled, pericarp fleshy :—

Drupes globose. ...

Drupes oblong. ...

Fruit mucronated or tubercled ; pericarp crustaceous :—

Sepals imbricate. ...

Sepals subvalvate. ...

3. *Allophylus*.4. *Dittelasma*.5. *Erioglossum*.6. *Cupania*.7. *Harpullia*.8. *Lepisanthes*.9. *Schleichera*.10. *Sapindus*.11. *Aphania*.12. *Xerospermum*.13. *Nephelium*.1. **CARDIOSPERMUM** Linn.

Cardiospermum Halicacabum Linn. Vern. *Kapalputa*, Ass. ; *Thaimodo-dukha*, Kach. ; *Sib-jhul*, *Nayaphatki*, Beng.

A thin wiry climbing herb with sulcate branches. *Leaves* alternate, bi-ternate, 2-3 in. long, deltoid in outline. *Leaflets* 3-1 in. long, lobed or coarsely dentate, acuminate, membranous, more or less pubescent. *Flowers* very small, white, polygamodioecious in few flowered umbellate cymes. *Peduncles* 3-5 in. long, very slender, the lowest pair of branches opposite and developed as spiral tendrils. *Sepals* 4, in unequal pairs, each with a scale at or above the base. *Ovary* 4-celled, with an ascending ovule in each cell. *Capsule* 3-celled, trigonously pyriform, inflated, loculicidal. *Seeds* about 1 in. diam., globose, arillate at the base, exalbuminous.

Common in drier uplands in the PLAINS, also in the NORTH CACHAR HILLS, e.g., Maibong, Dautuhaja, etc.

The seeds and roots possess valuable medicinal properties.

Fls. and Fr. 4-12.

2. **ÆSCULUS** Linn.

Æsculus punduana Wall. Vern. *Ikuhia*, *Raman-bih*, Ass. ; *Sarlak-asing*, Abor ; *Ramon-asing*, Miri ; *Phaklang-jan-arong*, Mik. ; *Phrado-buphang*, Kach. ; *Dingari*, *Khangkher* or *khangkhir khola*,

Mech ; Rimot, Bol-rimnu, Garo ; Dieng-chhang or Dieng-sang-kenrop, Dieng-dula or dola, Khasi ; Ngraurau, Naga.

A small or middle-sized deciduous tree with spreading branches and scaly buds ; bark greyish, warty outside, .25 in. thick ; inside whitish, speckled with numerous brown dots, exuding watery sap when cut. *Leaves* opposite, exstipulate, digitate ; common petiole 7-12 in. long, terete, glabrescent. *Leaflets* up to 7, gradually smaller from the terminal, 5-15 by 2-5 in., oblanceolate, acuminate, finely serrulate, subcoriaceous, glabrous ; main lateral nerves 20-25 on either half, almost transverse to the midrib at the base, slightly arched at the outer extremity, tertiary nerves slender, transverse to the lateral nerves, sub-parallel ; base acute ; petiolules .2-7 in. long, flattened above. *Flowers* irregular, white, .5-6 in. long (excluding the stamens) in large terminal thyrsoid panicles of penduncled cymes. *Panicles* up to 24 in. long, dun-pubescent when young ; pedicels gradually shorter upward. *Calyx* .2-3 in. tubular, lobes 5, imbricate, rounded at the apex, dun-canescens outside. *Petals* 4, rarely 5, white, unequal, clawed, externally pubescent, often with a yellow spot at the base. *Stamens* slender, usually 7, free, much exserted. *Disk* unilateral. *Ovary* 3-celled, cells with 2 superposed ovules ; style elongated, slender. *Fruit* a brown leathery rugose, ovoid or obovoid, apiculate, loculicidal capsule, 2-3 in. long ; valves 2-3, in each cell. *Seed* 1 in each cell, 1-2 in. long, brown, smooth with a very large oval hilum ; cotyledons thick, not separable.

Common along streams and ravines in the hills and their vicinity throughout the Province, ascending to 4,500 ft.

Wood white, soft, close-grained, weighing about 36 lbs. per c. ft., capable of being turned into cups, plates and vases and of being chiselled into toys, etc.

Figs. 1-2. Fr. 4-7.

3. ALLOPHYLUS Linn.

Shrubs or small trees. *Leaves* alternate, 1-3-foliolate, exstipulate. *Flowers* small, generally white, polygamo-dioecious, irregular in simple or branched racemes ; pedicels short ; buds globose. *Sepals* 4, in opposite pairs, outer pair small, inner cucullate, widely imbricate. *Petals* 4, very small or obsolete, usually with a shaggy scale above the claw. *Disk* unilateral, usually with 4 glands opposite the petals. *Stamens* 8, inserted on the receptacle inside the disk. *Ovary* usually 2-lobed and 2-celled, reduced merely to a pistillode in the male flowers ; styles 2, stigmatic on the inner face ; ovule one in each cell. *Fruit* indehiscent with 1-2 subglobose lobes. *Seeds* erect, usually with a short aril at the base ; embryo curved ; cotyledons plicate.

Leaves 1-foliolate ; racemes more or less branched.

Leaves 3-foliolate ; racemes simple.

..
..

1. *A. Zeylanicus*.
2. *A. Cobbe*.

1. *Allophylus zeylanicus* Linn.

A large shrub or small tree with terete glabrous branches and whitish bark; young shoots pubescent. *Leaves* 1-foliolate, 2-12 by 1-6 in., oblong, ovate or obovate, acuminate, usually toothed or repand, generally subcoriaceous, glabrous, often with a pair of short processes at the upper extremity of the petiole which is 1.5-2.5 in. long. *Racemes* usually long-peduncled, very variable in length, generally with a few branches at the base. *Flower-buds* globose, .04-12 in. diam. *Fruit* globose, red when ripe.

Two varieties occur in Assam:—

1. *assamica*; leaves quite entire, glabrous; racemes short.

2. *grandifolia*; leaves large, obovate, toothed or repand-denticulate, submembranous; racemes 2-4 in. long.

Doyang Reserve, SIBSAGAR DIVISION, Margherita, LAKHIMPUR, Abdul Haq! Ghuttermukh, CACHAR-Præzer! NAGA HILLS, Watt!

Fls. 4-5. Fr 9-10.

2. *Allophylus Cobbe* Bl. Vern. *Arhik-bouna*, Lushai; *Chi-eeh-rum*, Tipp.

A shrub up to 15 ft. in height with grey lenticellate bark. *Leaves* 3-foliolate; common petiole 2.5-7 in. long, finely channelled or margined. *Leaflets* very variable, 3-10 by 1-5 in., elliptic, obovate or lanceolate, lateral oblique, generally serrate, acuminate, membranous, dark-green and almost glabrous above, paler and glabrescent to pubescent beneath; lateral nerves 10-12 on either half, slender, arched; base cuneate; lateral petiolules 1-5 in., terminal 3-1 in. long. *Flowers* white, about 1 in. across when expanded, clustered on narrow, usually simple, axillary, puberulous or pubescent racemes, 3-9 in. long; pedicels very short, slender. *Petals* cuneate, shaggy above the claw. *Drupelets* .25 in. diam., globose, orange red, when ripe.

An exceedingly variable and widely distributed species of the forms mentioned by Hiern in F. B. I., the following may be separated within our area:—

I. Racemes simple; leaflets lanceolate.

Leaflets obscurely serrate, subentire, nearly glabrous; bracts small.

.. *glaber*.

Leaflets sharply and sometimes coarsely serrate.

Petioles, under surface of leaves and inflorescence pubescent to tomentose; bracts linear exceeding the buds.

.. *Aporetica*.

II. Racemes branched, solitary.

.. *Rheedii*.

III. Racemes simple, usually 2 together, petals not declinate.

.. *distachys*.

These forms are however connected by intermediate links.

Not uncommon in the DHANSIRI VALLEY, Lumding etc., in NOWGONG, also on the Northern slopes of the KHASI HILLS.

The fruit is edible when ripe and the roots possess astringent properties.

Fls. & Fr. apparently throughout the year.

The following may also be mentioned:—

A. longipes Radlk. Pflanzenreich. Heft 98. P. 592. A small tree. *Leaves* 3-foliolate; common petiole 1.5-4 in. long; leaflets 4.5-9 by 1.2-5 in.; lateral, somewhat smaller with shorter petiolules, narrow lanceolate, remotely serrulate, membranous, glabrous. *Racemes* 8-11.75 in. long,

not much branched; peduncle long. *Buds* about .08 in. across. *Sepals* glabrous. *Petals* broad, elliptic, scale deeply 2-fid, shaggy; ovary thinly hairy. *Lobes* of fruit 3-4 in. long.

GARO HILLS, Tura—Mrs. Parry.

A. subfalcatum Radlk. Records of Botanical Survey of India Vol III—5 (1907). A shrub? *Leaves* 3 foliolate; common petiole 2-3½ in. long. *Leaflets* 3½-9½ in., elongate, lanceolate, acuminate often falcate, base of the lateral ones often unequal, remotely serrate-dentate, chartaceous, glabrous. *Racemes* not much branched, 17-6 in. long; buds small. *Sepals* glabrescent. *Petals* cuneate; disc puberulous. *Ovary* pilose. *Lobes* of fruit 4 in. long.

ASSAM, KHASI HILLS.

4. DITTELASMA Hk. f.

Dittelasma Rarak Hook. f. Vern. *Am-selenga*, Ass. (Sib.).

A middle-sized or small tree scarcely exceeding 50 ft. in height in Assam with grey leathery plain bark; young parts softly tomentose. *Leaves* alternate, pinnate, 1-1½ ft. long; rachis tomentose when young, angled and ribbed. *Leaflets* (in Assam) 8 to 12, sub-opposite or alternate, 4-8 by 1-2½ in., falcately lanceolate or oblong, acuminate or cuspidate acute, quite entire, subcoriaceous, more or less pubescent when young, afterwards glabrescent or glabrous, pale beneath; main lateral nerves 20-25 on either half with one or more intermediate ones between them, tertiary nerves reticulate; base oblique, cuneate; petiolules 15-25 in. long. *Flowers* pale, polygamo-monoecious, bracteate, in large terminal or axillary rusty pubescent, panicles. *Sepals* 5, oblong, somewhat unequal; both sepals and petals tomentose outside. *Petals* oblong, each with a large hairy scale at the base, parallel to and nearly as long as the blade. *Disk* semicircular, glabrous. *Stamens* 8, equal; filaments hairy, inserted inside the disk and around the base of the ovary. *Ovary* globose, 3-lobed, 3-celled, with one ovule in each cell. *Fruit* of 3 cocci, but usually only one develops to maturity and attains about 1 in. in diam., indehiscent, with a fleshy saponaceous pericarp. *Seed* globose, exarillate, exalbuminous; testa horny; cotyledons unequal.

Not common in the NORTH CACHAR and KHASI HILLS up to 3,000 ft., also in UPPER ASSAM, especially in the SIBSAGAR DISTRICT.

The fruit has the same properties as that of the soap-nut (*Sapindus Mukorossi* and other allied species).

Fls. 6-7. Fr. 10-11.

5. ERIOGLOSSUM Bl.

Erioglossum rubiginosum Bl. Syn. *E. edule*. Bl. Vern. *Abigran*, Garo.

A small tree with dark-grey warty bark 2½ in. thick, which exfoliates in large pieces exposing a dark-brown or black surface; inside reddish-brown, fibrous; young parts rusty or golden tomentose. *Leaves* imparipinnate, 9-15 in. long, common petiole terete, velvety-tomentose. *Leaflets* 5-15, generally opposite or

subopposite, 4-10 by 1-3.5 in., oblong or elliptic, lateral more or less oblique, acuminate, entire, chartaceous, rusty-tomentose on both surfaces but glabrescent above; lateral nerves about 10 on either side of the midrib, arched, tertiary nerves reticulate; base unequal-sided; petiolules 1-2 in. long. *Inflorescence* 6-11 in. long of cymose clusters, borne or lax, usually paniced racemes, rusty-tomentose throughout; bracts linear, woolly. *Flowers* fragrant, brownish-white, irregular. *Calyx* 5 partite, segments about 15 in. long, two outermost smaller than others, 5 concave, imbricate in bud. *Petals* 4, slightly exceeding the calyx-lobes, obovate-oblong, clawed, each with a 2-lobed bearded scale. *Disk* 1-sided, lobed. *Filaments* 8, one forked, hairy; anthers 9. *Ovary* stipitate, 3-lobed; style declinate. *Fruit* of 3 drupels, black when also ripe.

Plains evergreen forests in the ASSAM VALLEY, not at all common.

The ripe fruit is eaten.

Fls. 3-4. Fr. 7-8.

6. CUPANIA Linn.

Trees or large shrubs. *Leaves* alternate, generally paripinnate; leaflets entire. *Flowers* small, polygamo-dioecious, in axillary or subterminal bracteolate panicles. *Sepals* 5-4, or sometimes united at the base, concave, in two series. *Petals* 5-4 or wanting, sometimes with scales at the base. *Disk* annular, fleshy, glabrous. *Stamens* 7-10, inserted within the disk. *Ovary* generally obovoid, 2-4-celled, with one ovule in each cell. *Fruit* capsular, usually loculicidal. *Seeds* globose or oblong, generally arillate, exalbuminous.

Middlesized tree. Flowers greenish.

Petals with two scales each.

Small tree. Flowers whitish. Petals often 0, without scales.

.. 1. *C. pentapetala*.

.. 2. *C. sumatrana*.

1. *Cupania pentapetala* W & A. Vern. *Koipura*, Sylh.

A fairly large tree. *Leaves* up to 12 in. in length; rachis not winged. *Leaflets* 4-8, sub-opposite or alternate, 4-8 by 1-2.5 in., ovate or oblong, bluntly acuminate, coriaceous, glabrous, shining; lateral nerves faint, slightly arched; base obtuse; petiolule 12-25 in. long. *Flowers* 5-merous, dull yellowish green. pubescent, about 15 in. diam., in racemes arranged in dense panicles. *Calyx* 5-cleft, lobes sub-valvate. *Petals* small with two glabrous incurved scales at the base. *Stamens* 7-8, exserted; filaments pubescent. *Disk* pubescent. *Ovary* 3-celled, pubescent; style short. *Capsule* stipitate, 4 in. across, pyriform, not lobed; seeds arillate.

SYLHET, Roxburgh

2. *Cupania sumatrana* Miq. Syn. *Mischocarpus pentapetalus* Radlk.

A small tree up to 40 ft. in height with a narrow crown; branchlets reddish. *Leaves* up to 2 ft. in length; rachis red. *Leaflets* up to 10, alternate or subopposite, 3-10 by 1.5-3 in., ovate or ovate-oblong, slightly acuminate, glabrous, chartaceous; lateral nerves very faint, often with axillary glands, petiolules 1.5-3 in. *Flowers* whitish, 1 in. across, in panicles 6-12 in. long. *Calyx* and *Stamens* as in the preceding species. *Petals* small or wanting, without scales. *Capsule* 6-8 in. long, pyriform, ribbed, apiculate on 3-gonous stipes, red when ripe.

SYLHET, Gomez!

7. HARPULLIA Roxb.

Harpullia cupanoides Roxb. Vern. *Jong-kil-thing*, Kuki; *Harpulli*, Beng. (Chitt.).

A deciduous tree up to 50 ft. in height with a straight trunk, bark greyish-brown outside, more or less thickly covered with black lenticels, green beneath the corky layers, inside greenish-white to light brown, granular, with strands of brownish fibrous tissue, 2-2.5 in. broad; branches ascending; young parts rusty-velvety, hairs both simple and stellate. *Leaves* 6-8 in. long; paripinnate or imparipinnate with a rudimentary terminal leaflet; common petiole terete, rusty-pubescent. *Leaflets* 8-12, generally alternate, rarely sub-opposite, 3-9 by 1-2.5 in., ovate, elliptic or elliptic-oblong, membranous or thinly coriaceous, entire, acute, glabrous above, glabrous or minutely puberulous and glaucous beneath, always more or less puberulous along the midrib and nerves beneath; main lateral nerves 10-16 on either half, slender, slightly arched; base subacute or oblique with the upper half rounded or sometimes cuneate; petiolules 2-3 in. long, rusty-velvety. *Flowers* about 3 in. long, pale-yellow, polygamous, in spreading pubescent panicles, 4-9 in. long from axils of existing or fallen leaves or extra axillary; bracts 3-1.5 in. long, spatulate, acuminate; bracteoles linear or subulate, tomentose; pedicels short. *Calyx* usually 5-partite; rusty-tomentose, lobes 2-2.5 in. long. *Petals* 5, about 6 in. long, oblong-lanceolate, clawed. *Stamens* 5; filaments shorter than the petals; anthers oblong. *Disk* very small, hairy. *Male flowers* with villous pistillode. *Ovary* 2-lobed, 2-celled, hairy; ovules usually 2 in each cell, pendulous. *Capsule* 1 by 1.5-2 in., compressed, transversely oblong, apiculate, shortly stipitate, inflated, pendulous, pale-yellow to bright-orange pubescent towards the base and often along the suture between the lobes. *Seeds* usually 1, 5-6 in. long, horizontal, obliquely ovoid-oblong, with a thick funicle and orange aril covering the base (?), hilum basal, testa dark brown, almost black; cotyledons green; radicle lateral; albumen 0.

NORTH CACHAR HILLS, Mupa Valley, Panimur, etc.

Wood white, soft, apparently not suitable for use as timber, weighing about 42 lbs. per c. ft. pores with white deposit inside.

Figs. 2-5. Fr. 5-6.

According to Roxburgh the aril covers the whole seed except the apex. In my specimens the aril forms a disk-like cup at the base only, but these may not have been sufficiently mature.

8. LEPISANTHES BL.

Lepisanthes burmanica Kurz.

An evergreen tree up to 25 ft. in height with a straight palm-like trunk; young shoots tomentose; bark fairly smooth, greyish-brown and with white blotches outside, leathery, reddish-brown inside. *Leaves* paripinnate, 2-3 ft. long; common petiole slightly channelled, pubescent. *Leaflets* 8-12, opposite or subopposite, 8-12 by 2-3 in., sometimes up to 14 by 4 in., elliptic or oblong-lanceolate, entire, acuminate, obtuse at the base, chartaceous, glabrous and dark-green above, puberulous along the midrib and nerves beneath, pinkish-white while very young; lateral nerves about 15 on either half, arched, prominent beneath; tertiary nerves reticulate; petiolules about 15 in. long, stout, puberulous. *Panicles* terminal or axillary, 12 in. or more in length, shaggy-tomentose, bearing numerous spike-like cyme-bearing racemes. *Flowers* pale-yellow, about 2 in. long, subsessile, mostly cymosely fasciated. *Sepals* 4-5, imbricate, orbicular, silky outside, glabrous inside. *Petals* 4, obovate or spatulate with a densely hairy scale above the claw. *Stamens* 8; filaments short, glabrous; anthers broad. *Disk* annular. *Ovary* densely woolly, 3 celled; ovules solitary in each, style short. *Fruit* drupaceous, about 3 in. diam., seed solitary; exalbuminous; cotyledons unequal.

Tippum near Jaipur, LAKHIMPUR, also in the Guma Reserve, GOALPARA; —not very common.

Wood white with wavy horny concentric bands; pores scanty but large; weight 36 lbs. per c. ft.

Fls. 5-6.

L. Listeri King ms.ex Radlk in Records of Botanical Survey Vol. III, P. 344.

A shrub? *Branchlet* terete; young parts somewhat harshly tomentose. *Leaves* with 4 pairs of leaflets, rachis striate, pubescent, 13-17 in. long or probably longer; petiolar portion 6-9 in. long. *Leaflets* subopposite, 6-5-13-5 by 2-5-6 in., upper usually larger, obovate-oblong to oblanceolate, shortly acuminate, narrowly obtuse at the base, thin, glabrous or puberulous on the midrib and nerves above, rough with minute harsh hairs beneath, nerves prominent on the under surface; lateral nerves many; petiolules stout, 3-5 in. long. *Racemes* supra-axillary, usually 2 or 3 together, 2-3-7 in. (sometimes about 7 in. in Burkill's sheet 3469 from Janakmukh, N.E. Frontier is this species), somewhat harshly tomentose at least when young. *Flowers* not seen. *Sepals* 5, ferruginous-tomentose; pedicels in fruit up to 4 in. long, articulate at the base. *Drupe* ellipsoid, about 1-7 in. by 1-3 in., with 3 compressed loculi, at first tomentose, less hairy with age, pericarp fleshy.

N. E. FRONTIER—Burkill! Duffla Hills—Lister!

Fr. 1.

L. assamica Radlk. Records of Bot. Survey Vol. III, P. 343.

A shrub? *Innovations* brown tomentose. *Leaves* paripinnate, 4-6 foliolate, rachis 12-14 in. long; leaflets subopposite, lanceolate-oblong, subcoriaceous; lateral nerves many, spreading, glabrous. *Racemes* axillary, fasciated, 1-3 in. long, densely dark-brown, pubescent; pedicels short, about 1 in.; buds subglobose up to about 2 in. across. *Sepals* 5, densely pubescent outside,

sericeous within. *Petals* 5, broadly spathulate, scales bilobed, limbriate; disk glabrous. *Stamens* 11-12; pistillode 3 locular, 3-grooved, villous. *Female* flowers and fruits not known.

SOUTH LUSHAI HILLS near Lungleh—Gage, 3000-4000 ft.

Flrs. 4.

9. SCHLEICHERA Willd.

Schleichera trijuga Willd.

A medium sized to large branchy, deciduous tree. *Bark* light or dark grey, exfoliating in irregular plates; blaze hard, pink; young parts rusty tomentose. *Leaves* alternate, paripinnate, rachis up to 6 in. long. *Leaflets* 4-8, opposite, terminal pair largest, then gradually smaller to the lowest pair, 2-9 by 1-3.5 in. oblong or elliptic, entire, rounded, subacute or shortly acuminate at the apex; base usually unequal, glabrescent, dark green and coriaceous when mature, crimson then fresh green and pubescent along the nerves when young, nerves prominent beneath. *Flowers* small, polygamous, in pedicellate clusters on slender interrupted racemes 3-6 in. long, simple or often branched in male flowers, crowded at the ends of branches and axillary, extra axillary or borne on abbreviated branches; pedicels slender. *Calyx* minute, 4-6 lobed, lobes blunt. *Petals* 0. *Disk* annular, wavy. *Stamens* 5-8, longer than the calyx. *Ovary* hairy outside, flask-shaped, narrowed to a rigid style, 3-celled; stigma lobed. *Fruit* indehiscent, 1 in. long, smooth, ovoid and short pointed with dry and crustaceous rind. *Seed* enclosed in fleshy aril, smooth, brown.

Collected by Mr. R. N. De in GARO HILLS.

This is the only record we have in the herbarium of this well known tree from ASSAM.

The best lac is reared on this tree. The seeds yield an oil which is used for burning. The fleshy aril of the seeds is edible. The wood is heavy and durable.

Leafless about Feb-March for a very short time.

Flrs. 3 with new leaves. Fr. 8-9.

Seedlings trifoliolate.

10. SAPINDUS Plum.

Sapindus Mukorossi Gaertn. Vern. *Ritha*, Ass. & Beng.; *Phenil*, *Arishta*, Sans.; *Manichal*, *Haitaguti*, Miri; *Haital-bang*, *Phucathai*, Cach.; *Hinghi*, Kuki; *Deny-spieng-rah*, Synt.; *Thi-dak-dak-arong*, Mik.

A small deciduous tree up to 40 ft. in height with a broad globose crown; bark dark-greenish-brown, fairly smooth, with many vertical lines of lenticels and fine fissures, 12 in. thick, inside greenish-white and very faintly speckled. *Leaves* 12-20 in. long, paripinnate; common petiole very narrowly bordered, glabrous. *Leaflets* 10-20, generally alternate, often subopposite or even opposite, 3.5-6 by 1-2 in., gradually smaller towards the apex of the rachis, lanceolate or oblong, entire, acuminate, coriaceous, glabrous, turning yellow before falling; main lateral nerves

12-25 on either half with one or two intermediate ones between, much arched, generally with a pit at the axil; base more or less oblique; petiolules 1-3 in. long. *Inflorescence* a compound terminal panicle, 12 in. or more in length with pubescent branches. *Flowers* about 1 in. across, polygamous. *Calyx-lobes* 4-5, somewhat unequal, ciliate. *Petals* 5, each with a woolly scale on either side above the claw. *Stamens* 8, inserted at the centre of the annular disk; filaments woolly; anthers versatile, exserted. *Ovary* 3-cornered, normally 3-celled, glabrous; style terminal; ovule solitary. *Fruit* a globose fleshy 1-seeded drupe, .7-1 in. across; pericarp and endocarp saponaceous, wrinkled and somewhat translucent when dry; seed .3-5 in. diam., globose, black, loose in dry fruit, testa crustaceous; albumen 0.

Cultivated in villages especially in the hills, and very often found as an escape in deciduous forests.

The wood weighs about 44 lbs. per c. ft., light-yellow, compact, close grained, but is not used as timber. The saponaceous covering of the fruit is a very good substitute for washing soap and is much used. The leaves are eaten by cattle.

Flrs. 5-6. Fr. 10-1.

11. APHANIA Bl.

Shrubs or small trees. *Leaves* alternate, paripinnate or unifoliate; leaflets entire. *Flowers* polygamous, small, in large terminal or axillary panicles or racemes. *Calyx* 4-6-lobed, usually cup-shaped; lobes imbricate, petaloid. *Petals* 4-6, small. *Disk* complete, slightly lobed. *Stamens* 5-8, rarely fewer, inserted within the disk. *Ovary* usually 2-celled; style bifid; ovules solitary. *Fruit* fleshy, smooth, deeply 2-lobed. *Seed* exarillate; cotyledons thick.

Leaves usually pinnate, leaflets distant.

Leaves unifoliate, generally crowded at the ends of branches.

.. 1. *A. rubra*.

.. 2. *A. Danura*.

1. *Aphania rubra* Radlk. Syn. *Sapindus attenuatus* Wall. Vern. *Tang-ting*, *Bon-gadhi*, Ass. (Lakh.); *Tiktiki*, Ass. (Sib.); *Maiki-Bandardima*, Ass. (Darr.); *Hekokeko*, Ass. (Kam.); *Lal-koipura*, Beng. (Sylh.); *Thai-khrok*, Mech; *Dieng-soh-jimmang*, Khasi; *Dodelchi-thong*, Garo.

Usually a shrub attaining 12 ft., sometimes with a subscandent habit, rarely a small tree up to 20 ft. in height, branches verrucose, often with minute vertical fissures. *Leaves* alternate, crowded at the ends of branches; leaflets 8-10, mostly subopposite, very variable in shape and size, generally 5-12 by 1.5-4.5 in., ovate, elliptic-oblong or ovate to oblong lanceolate, acuminate, entire, sub-coriaceous, glabrous; main lateral nerves 10-15 on either half, generally with a shorter intermediate one between, arched, tertiary nerves reticulate; base rounded or slightly cuneate, petiolules .3-5 in. long, swollen at the base. *Flowers* about .15 in. across, brick-red, glabrous, in large terminal or lateral, puberu-

lous or glabrate panicles. *Calyx* lobes 4-5, greenish outside, unequal, ciliate. *Petals* 4-5, as long as the sepals, sometimes with scale at the base. *Stamens* 6-8; filaments 0 or very short. *Ovary* 2-lobed. *Fruit* about 7 in. long, 1-2-lobed, ellipsoidal, red while ripening, purple and soft when fully ripe.

Found throughout the Province chiefly in evergreen types of forests.

Wood moderately hard and tough and used as tool-handles. The ripe fruit is eaten.

Flowers 11-1. Fr. 3-4.

2. *Aphania Danura* Radlk. Syn. *Sapindus Danura* Voigt. Vern. *Danura*, *Amburaj*, *Nunchha*, Beng.

An evergreen shrub or small tree. *Leaves* 1-foliolate, often so crowded at the ends of the branches as to appear verticillate, 4-12 by 1-5 in., obovate-elliptic, oblong or lanceolate, acute or very shortly acuminate, entire, coriaceous, glabrous and shining on both surfaces, gradually narrowed to a rounded or subcordate base; lateral nerves 12-16 on either side of the midrib with shorter intermediate ones; petiole 0.8-2 in. long, stout. *Flowers* small, yellowish-pink at the tips, in terminal panicles up to 12 in. long. *Sepals* 5, orbicular, unequal. *Petals* 5, each with a woolly scale at the base. *Stamens* 6-8; filaments short; anthers obtuse. *Disk* crenulate, glabrous. *Ovary* glabrous, 2-3-lobed. *Fruit* of 1-3 drupels, shortly stipitate, ellipsoidal, 3-5 in. long, turning orange-red to blackish in ripening.

SYLHET and CACHAR and possibly also GOALPARA.

Fls. 2-4. Fr. 5-6.

12. XEROSPERMUM Bl.

***Xerospermum Noronhianum* Bl. Vern. *Bura*, Beng. (Cach.); *Buru-buphang*, Kach.; *Khoirao*, Naga; *Dieng-soh-moni-ar-shree*, Khasi; *Shanpi*, *Khuranchi*, Garo.**

A middle-sized evergreen tree with a dense oval crown: young shoots puberulous. *Bark* dark-brown outside, uneven with warts, red with green streaks underneath the thin corky layer, reddish brown inside, fibrous, brittle. *Leaves* alternate, paripinnate, exstipulate; leaflets generally 4, rarely 2, more rarely 1, 3-6 by 8-15 in., elliptic to oblong lanceolate, acuminate, quite entire, coriaceous, glabrous, shining on both surfaces; lateral nerves 10-12 on either half, slender, arched; tertiary nerves closely reticulate; base cuneate; petiolules 15-25 in. long. *Flowers* small, light yellow or greenish in sub-simple fasciated axillary racemes of varying lengths up to 4 in.; pedicels up to 1 in. long. *Sepals* 4, imbricate, in 2 series, outer smaller, ciliate. *Petals* 4, ciliate without basal scales. *Disk* annular, glabrous. *Stamens* generally 8, inserted within the disk. *Ovary* didymous, 2-celled; ovule solitary, ascending. *Fruit* yellow, usually 1-lobed; lobes about 1 by 8 in., ellipsoid, muricated with low pyramidal

tubercles ; seed exarillate ; testa pilose ; cotyledons large, superposed.

Evergreen forests of UPPER ASSAM and the SURMA VALLEY, also in the HILL DISTRICTS up to 3,000 ft.,—not common. The wood appears to be hard, tough and heavy but coarse-grained.

Fls. 4-5. Fr. 11-3.

13. NEPHELIUM Linn.

Nephelium Longana Camb. Vern. *Naga-lichi*, Ass. (Lakh.) ; *Tokya*, *Kath-lechi*, *Mirgach*, Ass. (Nowg.) ; *Tagong-asing*, Abor ; *Asri-phang*, *Asuri-baphang*, Kach. ; *Marli-arony*, *Mirchesu*, Mik. ; *Marli-thing*, Kuki ; *Dieng-loba*, Khasi ; *Samphal-bol*, Garo ; *Eye-ball tree*, Eng.

A middle-sized evergreen tree up to 50 ft. in height, buttressed at base. *Bark* dark-grey and rough outside, reddish-brown and fibrous inside with fine concentric bands of whitish tissue. *Leaves* alternate ; common petiole terete. *Leaflets* 4-10, opposite or sub-opposite, rarely alternate, 2-10 by '6-2·5 in., elliptic, ovate or oblong-lanceolate, acute or acuminate, entire, subcoriaceous, glabrous and shining above, glaucous and generally soft beneath, red when young ; lateral nerves 12-20 on either half, tertiary nerves reticulate ; base more or less oblique ; petiolules '2-3 in. long, margined. *Flowers* polygamous, pale-yellow or dull-white, somewhat dimorphic, mostly in cymose clusters on the branches of terminal pubescent panicles, 6-12 in. long ; pedicels stout, buds globose. *Calyx* 5-6-lobed, lobes imbricate in bud, velvety tomentose on both sides. *Petals* generally 5, as long as the calyx-lobes, spatulate, pubescent. *Disk* tomentose. *Stamens* 6-10 ; filaments pubescent, longer in the male than in the female or hermaphrodite flowers. *Ovary* 2-3-lobed. *Fruit* '6-8 in. diam., globose, tubercled, purplish-red when ripe ; aril complete, thin, subacid.

Fairly common in evergreen types of forests in UPPER ASSAM and in the HILL DISTRICTS, ascending to 3,500 ft. in GARO HILLS, cultivated in most parts of India.

Wood close-grained, moderately hard, of a reddish colour, weighing about 55 lbs. per c. ft. It is used for posts and agricultural implements. The aril of the fruit is eaten.

Fls. 4-5. Fr. 7-9.

Nephelium Lit-chi Camb. Vern. *Lesi*, *Lisi*, Ass. ; *Nichu*, Beng.—is very closely allied to the above species. It has been successfully cultivated in some parts of Assam, e.g., Sibsagar, Dibrugarh and Gauhati. *Calyx* nearly truncate. *Petals* 6. *Disk* glabrous. *Fruit* about 1 in. long, tubercled, ovoid, ripening in May-June. Wood harder and heavier than of *N. Longana*.

Dodonæa viscosa Jacq. A stiff evergreen resinous shrub. *Leaves* alternate, exstipulate, subsessile, 1·5-3 by '2-1 in., oblanceolate, coriaceous, shining above. *Flowers* polygamous, inconspicuous, yellowish green, '2 in. across in short terminal panicles. *Calyx* 5 lobed ; lobes about '1 in. long. *Petals* 6. *Stamens* 8 ; disk inconspicuous. *Ovary* 3-4 celled. *Fruit* a compressed capsule, '5 in. long, membranous, 2-4 winged and septically 2-4 valved.

Sometimes grown in gardens e.g. Shillong.

FAM. 46. SABIACEÆ.

Climbing or erect shrubs or trees. *Leaves* alternate, exstipulate, simple or imparipinnate. *Flowers* small, 1-2 sexual, generally panicled. *Calyx* 4-5 cleft; lobes imbricate. *Petals* 4-5, imbricate, sometimes unequal. *Stamens* 4-5, inserted at the base of and opposite to the petals, all or two only perfect. *Disk* small, annular. *Ovary* 2-3 celled, compressed; ovules 1-2 in each cell; styles 1-2, free or connate. Fruit a drupe or of 1-2 dry carpels; seeds with a broad hilum; albumen 0.

- Climbers. Petals and stamens equal, the latter all fertile .. 1. *Sabia*.
 Trees or large erect shrubs. Petals and stamens unequal.
 Only two stamens fertile. ... 2. *Meliosma*.

1. SABIA Coleb.

Scandent shrubs. *Leaves* simple, quite entire. *Flowers* usually 2-sexual, solitary or in cymes or panicles, each supported by a pair of opposite bracts. *Calyx* of 4-5 equal lobes. *Petals* 4-5, equal, generally green or purplish, with translucent veins. *Stamens* 4-5, all fertile. *Disk* annular, 4-5 lobed. *Carpels* generally 2; styles 2, terminal in flower, more or less cohering; ovules 2 in each carpel. *Fruit* of 1 or two dry and gibbous carpels 1-seeded, each with the remains of the styles which become sub-basal in fruit; seed reniform.

- I. Cymes simple, 3-5-flowered. Flowers greenish purple. Stamens equal. .. 1. *S. purpurea*.
- II. Cymes dichotomous, 7-11 flowered. Flowers yellowish. Stamens unequal. .. 2. *S. parviflora*.
- III. Cymes many flowered :—
 - A. Leaves glaucous beneath; flowers greenish-white :—
 - Panicles from leaf axils or supra-axillary; cymes peduncled, corymbosely arranged. .. 3. *S. lanceolata*.
 - B. Leaves green beneath; flowers yellowish :—
 - Panicles racemiform, rachis and its branches glabrous. .. 4. *S. limoniacea*.
 - Panicles much branched, rachis and its branches pilose. .. 5. *S. paniculata*.

1. *Sabia purpurea* Hk. f. & Th. Vern. *Jermi-neirang-ehhai*, *Dieng-jermei*, Khasi.

A small straggling and rather bushy climber; branchlets green or greenish-purple; bark yellow inside. *Leaves* generally

2-3 by 1.1 in., but about twice this size on flowerless branches, oblong or lanceolate, long acuminate, softly and thinly coriaceous, puberulous when very young, otherwise glabrous, somewhat pale but shining beneath; main lateral nerves 3-4 on either half, slender, straggling with three or four intermediate nerves between them, much anastomosing; base generally rounded; petiole 2.5 in. long. *Peduncles* axillary, shorter than the leaves, filiform, irregularly branched, 3-5 flowered; pedicels 5-6 in. long. *Sepals* about .06 in. long, ovate. *Petals* nearly 16 in. long, oblong-lanceolate, purplish-brown, 5-nerved, tips often reflexed. *Filaments* subulate. *Drupes* generally solitary, 2-3 in. across, orbicular, compressed, rugose, blue when fully ripe, with the style on one side a little above the calyx.

Fairly common in the KHASI HILLS, 4-6000 ft.

Flrs. 3-4. Fr. 6-7.

2. *Sabia parviflora* Wall.

A climbing shrub somewhat more woody and more rigid than the foregoing species and in some respects intermediate between it and the next species; young parts thinly pubescent. *Leaves* 2-4 by 1.1-1.3 in., ovate-oblong or ovate-lanceolate, with wavy margins, acuminate, coriaceous, glabrous, somewhat pale beneath, midrib stout; lateral nerves about 10 on either half, almost horizontal, joined by two lines of arched intramarginal veins far within the margin; base rounded; petiole 2.4 in. long, slightly puberulous or glabrous. *Cymes* dichotomous, 7-11 flowered; peduncles 1.1-1.5 in.; pedicels about 2 in. long. *Flowers* minute. *Sepals* ciliate. *Petals* oblong, 5-nerved. *Filaments* ligulate, unequal. *Drupels* 1-2 together, 2.4 in. across, compressed; stone sub-reniform, prominently pitted and ridged on the margin.

KHASI HILLS, 3250 ft., Barpani Forest; 4-5000 ft., Mann. Not common.

Flrs. 4-5 (?). Fr. 7-8.

3. *Sabia lanceolata* Colebr. Vern. *Miri*, *Mandri*, Garo; *Samtameh*, Khasi.

A climbing shrub; bark black, yellowish inside. *Leaves* 3-7 by 1-2 in., bifarious, oblong-lanceolate or oblong, caudate acuminate, acute or rounded at the base, subcoriaceous or membranous, shining above, glaucous beneath; main lateral nerves 8-12 on either half, generally almost horizontal, joined by an intermarginal nerve well within the margin; petiole 2.4 in. long. *Panicles* peduncled bearing corymbosely arranged, peduncled cymes; peduncles axillary or supra-axillary; 1.5-2 in. long, slender, glabrous; rachis of panicles puberulous or glabrate; pedicels about 15 in. long, slender. *Flowers* greenish-white, sweet-scented. *Sepals* broadly ovate. *Petals* 15 in. long, ovate-acuminate, imbricate in bud. *Filaments* shorter than the petals, broadly

winged. *Fruit* generally of compressed sub-pyriform ; drupels '6-7 in. long, blue when ripe.

Plains of the BRAHMAPUTRA VALLEY also the KHASI and GARO HILLS up to 6,000 ft. Fairly common.

The leaves are used by the Garos for fomenting in cases of swellings and pain on the ankle or wrist.

Flrs. 11-12. Fr. 3-4.

4. *Sabia limoniacea* Wall.

A large climber ; bark blackish smooth and shining, yellow inside. *Leaves* 3-8 by 1.25-3.25 in., oblong to ovate-lanceolate, elliptic or oblong, acute or acuminate, thickly coriaceous, dark-green above, somewhat pale and often pinkish underneath, turning yellow when old ; main lateral nerves 5-6 on either side of the midrib, much arched, tertiary nerves reticulate and very prominent beneath ; base rounded or subacute ; petiole '6-1 in. long, channelled. *Panicles* axillary or supra-axillary, 3-5 in. long, racemiform, reddish, quite glabrous, with persistent bud-scales at the base ; pedicels '1-12 in. *Flowers* '1-12 in. across, greenish-yellow. *Calyx* lobes orbicular or broadly ovate. *Petals* '1 in. long, ovate or obovate, 5-nerved. *Stamens* included. *Fruit* of one or two drupels, each about '5 in. across, much compressed, red when ripe.

Throughout the plains of both VALLEYS, also up to 3,000 ft. in the HILLS, generally in evergreen types of forest.

Flrs. 12-2. Fr. 2-4.

5. *Sabia paniculata* Edgew.

A large evergreen climber ; stem dark-grey. *Leaves* 3-8 by 1.5-3 in., oblong-lanceolate, acuminate, coriaceous, dark-green and shining above, pale beneath ; main lateral nerves 6-8 on either half, much arched, tertiary nerves strongly reticulate ; base generally rounded ; petioles '3-6 in. long, shallowly channelled. *Flowers* yellow, inodorous, '15-2 in. across, in large lateral often leaf-bearing panicles ; ramifications and pedicels slender, red, pilose. *Sepals* elliptic, densely hairy outside. *Petals* about '1 in. long, oblong, 3-5 nerved, glabrous. *Filaments* ligulate. *Fruit* usually of a solitary drupel, '3 in. across, orbicular, compressed.

Along the foot of the Himalayas in NORTH KAMRUP, generally affecting shady and swampy localities.

Flrs. 1-2. Fr. 5-6.

Sabia ? sp. A large woody climber. *Leaves* 5-8 by 2-3 in. elliptic-oblong or oblong, abruptly short acuminate, coriaceous, glabrous, lateral nerves 6-8, much arched and anastomosing within the margin ; petiole swollen at the top, '4-8 in. long. *Flowers* not seen. *Cymes* few flowered, not peduncled ; pedicels puberulous, stout, '2 in. long. *Drupe* usually solitary, about '4 in. long.

Sheet No. 3793. Materials incomplete for identification.

Charduar—DARRANG.

Fr. 4.

2. MELIOSMA Bl.

Trees or shrubs, usually with hairy extremities. *Leaves* simple, or imparipinnate. *Flowers* small in large terminal or lateral thyrsoid panicles. *Sepals* and *petals* 4-5, unequal. *Stamens* usually 5, two fertile and adnate to the smaller petals, the rest without anthers; anther cells of the fertile stamens globose, attached to a large flat connective. *Disk* 4-5 toothed, cup-shaped, membranous. *Ovary* sessile, usually 2-celled; ovules 2 in each cell; style 1, subulate. *Fruit* a drupe, obliquely globose; endocarp bony. *Seed* solitary; cotyledons folded.

I. Leaves simple:—

Mature leaves glabrous; fruit pyriform, nearly 5 in. long.

.. 1. *M. Mannii*.

Mature leaves more or less puberulous beneath; fruit globose, about 2 in. across.

.. 2. *M. simplicifolia*.

II. Leaves imparipinnate; leaflets more or less pubescent; fruit globose, not exceeding 2 in. in diam:—

A. Leaflets distantly serrate:—

Leaflets 7-13.

.. 3. *M. Wallicifol.*

Leaflets 13-25.

.. 4. *M. pinnata*.

B. Leaflets quite entire, 11-15.

.. 5. *M. Arnotiana*.

1. *Meliosma Mannii* Lace.

A small tree; branchlets and ramifications of inflorescence covered with oblong lenticels. *Leaves* 2.5-5 in. long, oblong or oblanceolate, distantly serrate-toothed or entire, rounded or somewhat acute at the apex, coriaceous, glabrous, shining above; lateral nerves 8-10 on either half, oblique, slightly arched, with tufts of hair-like scales at the axils, tertiary nerves finely reticulate; base cuneate; petiole 3.5 in. long, swollen at the base. *Inflorescence* terminal, 8-10 in. long and as broad, dense-flowered, puberulous, lower part leafy. *Flowers* white, about 12 in. across on pedicels .05-1 in. long. *Sepals* generally 4, unequal, minutely ciliate. *Petals* 5, the three outer orbicular, concave, about .08 in. long. *Fruit* a pyriform drupe, 4-5 in. long, scarlet when fully ripe, 1-celled, 1-seeded; pericarp fleshy, smooth; endocarp rugose and with a median ridge; cotyledons fleshy, oily.

KHASI HILLS, very rare. Distribution:— UPPER BURMA.

Firs. (?) Fr. 1-2.

2. *Meliosma simplicifolia* Roxb. Vern. *Thowthowa*, Ass.; (Sibs); *Larubandha*, Ass. (Lakh.); *Pichola*, Ass.; (Darr.); *Sankonaro*, Ass. (Darr.); *Hengunia*, Ass. (Nowg.); *Phoko*, *Dhapapatia*, Ass. (Kam.); *Gurban-asing*, Miri & Abor; *Nitak-asing*, Miri; *Phaglan-jan-arong*, Mik.; *Dieng-lyng-krong*, *Dieng-la-pia*, *Dieng-nong-krow*, Khasi; *Nah-pui*, *Thing-erkum*, Kuki; *Lai-doibru*,

(or Dibru ?), Meeh ; *Borsiring*, *Thaukhu-khokhra*, *Babari-chi*, *Sannabat*, Garo ; *Bon-khoklu*, Cach. ; *Koaso*, Naga.

A small tree, almost evergreen; bark greenish-grey outside, pink inside with very fine reticulating veins of deeper red, turning to reddish tan-brown after exposure, '3-5 in. thick, fibrous ; exuding a watery juice from cuts ; branchlets pubescent or puberulous. *Leaves* 5-15 by 1.5-6 in., oblanceolate or obovate-oblong, shortly acuminate or rounded at the apex, entire or distantly serrate-toothed, chartaceous or subcoriaceous, glabrous above, puberulous or glabrescent beneath ; main lateral nerves 14-22 on either half, oblique but nearly straight, joining at the extremities to form a more or less continuous scalloped intermarginal vein ; base very acutely cuneate ; petiole 1-1.5 in. long, margined, swollen at the base, pubescent or glabrate. *Panicles* as long as or sometimes longer than the leaves, terminal with lower branches often from the axils of the upper leaves, pubescent. *Flowers* white, turning to pale-yellow, sessile or subsessile, scarcely .1 in. across., buds globose. *Sepals* ciliate. *Petals* 3, outer large, orbicular, 2 inner scale-like, bifid. *Drupe* about .2 in. across., globose ; endocarp keeled and reticulate, rugose.

Common throughout the province, ascending to 3,000 ft. in the Hills.

Wood light reddish brown, moderately hard, pores evenly distributed, medullary rays numerous, moderately broad, weight about 33 lbs per c. ft.

Fhrs. 1-5. Fr. 3-6.

3. *Meliosma Wallichii* Planch. Vern. *Dieng-sngit*, Khasi ; *Dieng-chidit*, *Dieng-sniat*, *Dieng-la-myrsiang*, Syat.

A middle-sized tree up to 60 ft. in height and nearly 5 ft. in girth ; branchlets rusty puberulous ; older branches dotted with raised lenticels ; bark dark-grey or greyish-brown, often with horizontal wrinkles, fibrous, inside white, on large trees in alternate broad radial bands of white and pink turning to tan-brown on exposer. *Leaves* imparipinnate, about a foot long, rachis terete, rusty-tomentose. *Leaflets* 5-13, opposite or subopposite, 3-7 by 1-2 in., ovate, obovate-oblong or oblong, acuminate, distantly cuspidate-serrate or on very old trees entire, subcoriaceous, glabrous and often with a grey metallic lustre above, rusty-tomentose beneath ; lateral nerves 8-12 on either half, slanting and much arched ; base rounded, more or less oblique ; petiolules .2-.7 in. long. *Panicles* terminal, much branched, rusty-tomentose. *Flowers* very small, shortly pedicelled. *Sepals* orbicular-ovate. *Petals* sub-valvate. *Drupe* globose, about .2 in. across., reddish when ripe.

KHASI & JAINTIA HILLS 2500-6000 ft.

Wood very light, soft, spongy, light brown, medullary rays broad with finer ones in between, pores large, handsome on radial section with conspicuous silver grain liable to crack.

Fhrs. rainy season. Fr. cold season.

4. *Meliosma pinnata* Roxb. Vern. *Hengnuu* or *Hengunia*, *Banpasola*, *Manoi*. Ass., *Dermi-asing*, *Miri*; *Nammu-Changne*, *Duff*; *Toiram*, *Kuki*; *Dieng-krot*, *Dieng-soh-naior*, *Khasi*; *Botnichik*, *Botandime*, *Gapenda*, *Garó*.

Usually a small tree up to 35 ft. in height but occasionally grows up to 50 ft. *Bark* grey or brownish outside, dark-green underneath the cuticle, inside red, oxidising to brown after exposure. *Leaves* imparipinnate, 9-18 in. long; rachis terete, more or less puberulous. *Leaflets* 11-25, opposite or subopposite, 3-8 by 7-1.5 in., oblong-lanceolate, long-acuminate, usually distantly cuspidate-serrate, subcoriaceous, glabrous above, more or less pubescent beneath, especially along the reddish midrib and nerves, brownish-red when young; lateral nerves about 15 on either half, much arched, tertiary nerves closely reticulate; base acute or cuneate; petiolule 1-2 in. long, pubescent. *Panicles* terminal, 1 ft. or more in length with spreading branches. *Flowers* white, minute, sessile or shortly pedicelled; *Sepals* broadly or suborbicular, ovate, ciliate. *Petals* glabrous. *Drupe* globose, about .2 in. across.

Common throughout the PLAINS DISTRICTS of both VALLEYS and up to 3000 ft. in the HILLS.

The wood is light, porous and brittle, and of no timber value. The young leaves are eaten by the Miris cooked with fish.

Flrs. 4-6. Fr. 8-9.

5. *Meliosma Arnottiana* Wight?

A tree up to 40 ft. in height; branchlets rusty velvety tomentose. *Leaves* 6-10 in. long; common petiole and petiolules rusty pubescent. *Leaflets* 11-15, opposite or subopposite, 2-4 by 7-1.5 in., ovate to oblong lanceolate, caudate-acuminate, quite entire, chartaceous, glabrous above, rusty pubescent beneath; lateral nerves 8-10 on either half, oblique, slightly arched with a tuft of bristles at the axils; tertiary nerves closely reticulate; base rounded or subacute; petiolules 2-5 in. long. *Panicles* terminal, about a foot long, much-branched, ramifications rusty pubescent. *Flowers* minute, sessile or very shortly pedicelled. *Sepals* ovate, puberulous, ciliate. *Petals* subvalvate. *Drupe* globose, about .15 in. across.

Barapani in the KHASI HILLS, —rare.

Flowers in our specimens are much smaller than in the type.

Flrs. 5-6. Fr. 7-8.

FAM. 47. ANACARDIACEÆ.

Trees or erect shrubs, the latter very rarely scandent, generally with a acrid milky or resinous juice. *Leaves* alternate (in all the species described here), simple, trifoliate or imparipinnate, exstipulate. *Inflorescence* generally a terminal panicle. *Flowers* small, mostly regular, unisexual and polygamous or bisexual. *Calyx* 3-5-partite. *Petals* free, as many as the calyx-divisions and alternating with them, imbricate or valvate in bud, sometimes accrescent, rarely 0. *Disk* cup-shaped or annular. *Stamens* usually as many as the petals, rarely twice as many, inserted under or on the disk, sometimes not all fertile. *Ovary* usually superior and 1-celled; styles 1-4; ovule solitary in each cell, pendulous. *Fruit* a drupe; seed exalbuminous; cotyledons plano-convex.

- | | | |
|--|-----|--|
| I. Stones 1-celled, 1-seeded, more or less compressed :— | | |
| A. Pericarp dry. Leaves 3-foliate* or pinnate. Trees or erect shrubs. | .. | 1. <i>Rhus</i> . |
| B. Pericarp more or less fleshy :— | | |
| 1. Leaves simple. Trees :— | | |
| a. Receptacles of fruit enlarged and fleshy. | ... | 2. <i>Semecarpus</i> . |
| b. Receptacles of fruit not enlarged :— | | |
| i. Stamens 4-5, usually only one, fertile. Ovary superior. | .. | 3. <i>Mangifera</i> . |
| ii. Stamens 4-5, all fertile. Ovary inferior :— | | |
| Leaves entire; petiole spurred. | .. | 4. <i>Holigarna</i> . |
| Leaves undulate; petiole not spurred. | .. | 5. <i>Drimycarpus</i> . |
| 2. Leaves imparipinnate :— | | |
| Trees. Stamens 8-10. | .. | 6. <i>Lannea</i> . |
| Climbers. Stamens 10. | .. | 7. <i>Tapiria</i> .
(<i>Odina</i>). |
| II. Stone 1-5 celled, not compressed, pericarp fleshy, Leaves imparipinnate. | .. | 8. <i>Spondias</i> . |

1. RHUS Linn.

Trees or shrubs with resinous or acrid juice. *Leaves* 3-foliate or pinnate, rarely simple. *Flowers* small, polygamous, paniced. *Calyx-limbs* 4-6; petals 4-6, imbricate. *Disk* fleshy, annular. *Stamens* 4-10, inserted at the base of the disk, often lobed. *Ovary* sessile, 1-celled; styles 3. *Drupe* dry, with a pendulous seed.

* Assam species.

- I. Leaflets pubescent or tomentose beneath :—
 Petiole winged, densely pubescent. .. 1. *R. semialata*.
 Leaflets 4-6 pairs. ..
 Petiole not winged, slightly
 pubescent. Leaflets 5-12 pairs. .. 2. *R. khasiana*.
 Petiole not winged, glabrous or
 nearly so. Flowers pedicelled. .. 3. *R. insignis*.
 II. Leaflets glabrous beneath :—
 Panicles slender, glabrous or
 nearly so. Flowers pedicelled. .. 4. *R. succedanea*.
 Panicles stout, pubescent.
 Flowers sub-sessile. .. 5. *R. Griffithii*

1. *Rhus semialata* Murr. Vern. *Naga-tenga*, Ass.; *Soh-ma*, *Dieng-soh-ma*, *Dieng-soh-sma*, Khasi; *Dieng-sa-ma*, Synt.; *Khetma*, *Khitma*, Garo; *Gimbao*, Kach.; *Khok-ma-thing*, Kuki; *Bhakhimlo*, Nep.

A small deciduous tree somewhat gregarious in habit, young parts and inflorescence covered with dark-grey pubescence; bark ashy-grey, warty, dull greenish-white inside. *Leaves* imparipinnate, over a foot long; common petiole usually winged between upper leaflets. *Leaflets* 4-6 pairs, opposite, lateral sessile, 2-4 by 1-2 in., elliptic ovate or oblong-lanceolate, acuminate, deeply crenate or dentate, membranous, pubescent along the midrib, otherwise glabrous above, densely grey-tomentose beneath; main lateral nerves 10-15 on either half, parallel, almost transverse; base rounded, oblique. *Panicles* terminal, 6-8 in. long, conical, dense-flowered. *Flowers* 1 in. across, whitish or pale-green; pedicels minute. *Sepals* small, ovate, pubescent. *Petals* oblong, ciliate, much exceeding the sepals. *Drupe* 1.5-2 in. across, sub-globose, compressed, pink when mature.

Common in the KHASI HILLS above 2,500 ft., also found along the foot of the Himalayas e.g., Dulong-mukh, Khalingduar, etc.

The ripe fruit has a sharp acid taste and is much eaten by the Nepalese. It is also used as a substitute for rennet in preparing curds. It is said to be a remedy for colic.

Fls. 5-9. Fr. 9-4.

2. *Rhus khasiana* Hk. f.

A middle-sized tree up to 45 ft. in height; bark 7 in. thick, greyish-brown and rough outside, split into oblong plates, red below the outer dead layers, inside finely fibrous, light red, mottled with white streaks. *Leaves* pinnate, 12-18 in. long; common petiole slender, minutely grey-puberulous, glabrescent. *Leaflets* 5-12 pairs, often alternate, 3-5 by 6-1.7 in., lanceolate, sharply serrate or sub-entire, acuminate, membranous, glaucous and hairy along the midrib and nerves beneath; lateral nerves about 15 on either side of the midrib, very slender, slightly arched; base obliquely cuneate; petiolules about 2 in. long. *Panicles* terminal, rather lax. *Drupe* 3 in. across, orbicular-ovate, compressed, pedicelled; epicarp papery; endocarp fibrous.

KHASI HILLS, not common.

3. *Rhus insignis* Hk. f.

A handsome tree up to 30 ft. in height; branchlets stout, with rusty-villous tips. *Leaves* 12-20 in. long; common petiole terete but slightly angled towards the base, glabrous, speckled with lenticels. *Leaflets* 7-11, 3-9 by 1·7-3·5 in., ovate, oblong or lanceolate, abruptly or tapering acuminate, entire, sub-coriaceous, glabrous and shining above, softly rusty-tomentose beneath; lateral nerves 20-30 on either half, parallel, slightly arched, tertiary nerves strong; base unequally rounded, sometimes cordate; petiolules 15-25 in. long, glabrous. *Panicles* axillary, shorter than the leaves, lax, long-peduncled, rachis and ramifications lenticelled, glabrous. *Flowers* 1 in. across. *Petals* with a stout midrib. *Drupe*s globose, 3 in. across; epicarp thin, dry; endocarp waxy; stone crustaceous.

KHASI HILLS. not common,—Nartiang, Jowai Sub-Division—Distribution—Sikkim.

Fls. 5-6. Fr. 7-10.

4. *Rhus succedanea* Linn. Vern. *Dieng-kean* or *-kain*, *Ka-kain*, Khasi; *Dieng-suit*, Synt. (Nartiang); *Thing-lran*, Kuki; *Bol-micheng*, *Bol-khat-thi*, Garo.

A middle-sized deciduous tree up to 50 ft. in height. *Bark* 1-15 in. thick, dark-grey and rough outside, split with vertical reticulate fissures and exfoliating in irregular flakes, white to very light brown inside, faintly mottled with strands of darker brown fibres,—on young parts plain and with horizontal lines or lenticels. *Branchlets* usually glabrous. *Leaves* imparipinnate, crowded at the ends of branches; common petiole swollen at the base, terete, glabrous. *Leaflets* 3-6 pairs, opposite, 2-6 by 7-2 in., ovate to lanceolate or oblong, long-acuminate, entire, thinly coriaceous, usually quite glabrous, pinkish brown when very young, turning red before falling; main lateral nerves 12-25 on either half, straight, almost transverse, often alternating with shorter intermediate ones; base acute or rounded, more or less oblique; petiolules 2-4 in. long, slender or fairly stout. *Panicles* axillary, 5-10 in. long, with slender and drooping branches, usually glabrous. *Flowers* greenish yellow, scarcely 1 in. in diam. *Sepals* ovate, obtuse. *Petals* much larger, oblong. *Disk* 5-lobed. *Drupe*s 25-3 in. in diam., orbicular-compressed, rugose, glabrous, shining yellow or tan-brown; epicarp thin, bursting irregularly; mesocarp fibrous; stone compressed, hard, surrounded with a thick coating of wax.

Fairly common throughout the province, specially in the hills and their neighbourhood.

Wood greyish white, twining brown with age, heartwood small, yellow. In this province the wood is heavier (44·6 lbs. per c. ft), harder and tougher than given in Gamble's Timber Manual in respect of W. Himalayan specimens and seems to be suitable at least for agricultural implements. The wax of the

seeds is made into candles in Japan where the tree is also tapped for the famous lacquer varnish. The juice is corrosive.

Fis. 3-4. Fr. 1-5.

5. *Rhus Griffithii* Hk. f. Vern. *Darmi-asing*, Miri, also the names usually given to the foregoing species.

A smaller tree with a more open crown than *R. Succedanea*. *Bark* .25 in. thick, greyish-brown, lenticelled, otherwise plain, inside light-red, mottled with specks of deeper red, exuding a brown gum from cuts. *Leaves* imparipinnate, crowded at the ends of branches, 1-2 ft. long, quite glabrous; common petiole terete red. *Leaflets* 4-10 by 1-3.5 in., oblong, ovate or elliptic; lanceolate, acuminate, often abruptly, quite entire, coriaceous, more or less shining when mature; midrib red; lateral nerves 16-20 on either half, strong, parallel; base cuneate; petiolules stout. *Panicles* axillary, 5-6 in. long, branches pubescent, glabrate in fruit. *Flowers* .1 in. in diam., sessile or shortly pedicelled. *Sepals* ovate, pubescent. *Petals* linear-oblong. *Stamens* exserted. *Disk* lobed. *Drupe* about .25 in. across, orbicular or obliquely ovate, compressed; epicarp thin; stone surrounded with wax.

Fairly common in UPPER ASSAM and the HILLS.

The wood is of the same quality as of the preceding species. The young leaves are used as a vegetable by Miris and Abors.

Fis. 3-5. Fr. 7-10.

2. SEMECARPUS Linn. f.

Tree generally with acrid juice. *Leaves* alternate, simple, entire, coriaceous. *Flowers* polygamous or dioecious, generally in terminal panicles. *Calyx* 5-6-fid, segments deciduous. *Petals* 5-6, imbricate, usually much exceeding the sepals. *Disk* broad, annular. *Stamens* 5-6, inserted outside and below the disk, imperfect in the female flowers. *Ovary* 1-celled; styles 3. *Drupe* fleshy, oblong, more or less obliquely seated on a fleshy receptacle formed of the accrescent calyx-tube and the disk; pericarp filled with an acrid juice. *Seed* pendulous; testa coriaceous; cotyledons plano-convex; radicle superior.

Leaves pubescent beneath. Flowers .2-.3 in.

across; drupe obliquely oblong. ..

Leaves glabrous beneath. Flowers scarcely

.1 in. across; drupe transversely oblong. ..

1. *S. Anacardium*.

2. *S. Prainii*.

1. *Semecarpus Anacardium* Linn. f. Vern. *Bhela*, *Bhala*, Beng. & Ass.; *Bar-bhola*, Ass. (Nowg.); *Bhaola*, *Bhalo*, *Bhelawa*, Mech; *Bol-agal*, *Baveri*, *Babari*, Garo, *Barla-arong*, Mik.; *Dieng-soh-bhala*, Khasi; *Pursho-bhola*, Nep. *Bhallataka*, *arushkara*, Sans. The marking nut tree.

A moderate-sized deciduous tree; young parts and inflorescence pale velvety tomentose. *Bark* dark-brown to blackish-grey

outside, rough, split vertically, light-red inside, '3-5 in. thick, exuding an acrid milky juice. *Leaves* alternate, simple, crowded at the extremities of branches, 8-24 by 4-14 in., obovate or elliptic oblong, sometimes pandurate, generally rounded at the tip, sometimes subacute, entire, thinly coriaceous, harsh with short scattered bristles, but glabrate with age, and dark green above, brownish-grey and tomentose beneath, specially along the nerves; midrib very stout; lateral nerves 16-24 on either half, prominent beneath, straight or slightly arched; base sub-acute or rounded, sometimes abruptly cordate; petiole 1-2 in. long, very stout, flattened above. *Panicles* terminal, lower branches often from upper leaf axils. *Flowers* '2-3 in. across, sessile, in fascicles on the branches of the panicles; bracts lanceolate or subulate. *Calyx* obconic, 5-cleft, densely buff-velvety outside. *Petals* greenish-yellow, about 15 in. long or lanceolate, pubescent outside, glabrous within. *Disk* shaggy. *Filaments* subulate. *Styles* densely hairy. *Drupe* 1 in. long, somewhat obliquely oblong-ovoid, usually of the shape of a miniature mango, compressed, shining, black when ripe, seated on an orange coloured, fleshy receptacle formed of the disk, the base of the calyx and the extremity of the stalk.

Fairly common in deciduous forests in the BRAHMAPUTRA VALLEY (and up to 2,000 ft. in the HILLS).

Wood soft and light, not used as timber. The cup of the ripe fruit is eaten raw, dried or roasted. The pericarp of the fruit contains an acrid juice which is used as marking ink, and in medicine.

Fls. 7-9 with new leaves. Fr. 12-3.

Somewhat rare in UPPER ASSAM and the SURMA VALLEY.

2. *Semecarpus Prainii* King Journ. Ass. Soc. Beng. 65 (1897), 511. Syn. *S. heterophyllus* Hk. f.

A large tree with rough brown bark and glabrous branchlets. *Leaves* 5-12 by 1.5-4 in., oblanceolate, abruptly obtusely acuminate, quite entire, coriaceous, dark-green and shining above, buff-grey and rather strongly reticulate beneath, quite glabrous on both surfaces; lateral nerves 15-20 on either half, abruptly arched near the margin, otherwise straight, tertiary nerves transverse to the secondary nerves; base very gradually narrowed to the petiole; petiole '7-1.5 in., slightly swollen at the base and depressed above. *Panicles* terminal, exceeding the leaves, branched down to the base with thinly pubescent branches. *Flowers* dioecious; bracts subulate. *Males* about 1 in. across, sessile in clusters of 3-8; buds globose; calyx pubescent, segments ovate or ovate-oblong, ciliolate. *Petals* elliptic to suborbicular, glabrous. *Female* flowers not seen. *Drupe* '5 in. long, broader than long; receptacle '3 in. long, obconic.

Very rare. Patharia Reserve, SYLHET (B. C. Sen Gupta) Dist. Java, Sumatra.

Fls. 3-4.

3. MANGIFERA Linn.

Evergreen trees, all parts more or less aromatic. *Leaves* alternate, simple, petiolate, coriaceous. *Flowers* small, polygamous in terminal panicles; bracts deciduous. *Calyx-segments* 4-5, imbricate, deciduous. *Petals* 4-5, imbricate with thickened longitudinal nerves. *Stamens* 4-5, inserted between the lobes of the fleshy disk, usually one only perfect and much larger than the others. *Ovary* sessile, 1-celled, oblique: style lateral, simple; ovule 1, pendulous from a basal funicle. *Drupe* large, fleshy; stone fibrous, more or less compressed; cotyledons fleshy, plano-convex, often unequal.

Leaves oblong-lanceolate, thickly coriaceous, lateral

nerves nearly transverse:—

Panicles pubescent. Flowers yellowish,

sessile. Drupe blunt. ..

1. *M. indica*.

Panicles glabrous. Flowers white on

fairly long pedicels. Drupe long acuminate. ..

2. *M. sylvatica*.

Leaves obovate, thinly coriaceous, lateral

nerves very oblique. Flowers pedicelled.

Drupe blunt. ..

3. *M. andamanica*.

1. *Mangifera indica* Linn. Vern. *Am*, Ass. & Beng.: *Keidi-asing*, Miri; *Thekachu*, Garo; *Tharbi-arong*, Mik; *Dieng-soh-pien*, *Dieng-thlai-nar*, Khasi; *Thaiguja-baphang*, Kach; *Tagung-change*, Duff; *haidai*, Tipp.; *Amra*, *rasala*, *madhuduta*, Sans. The mango tree.

A large evergreen tree with rough thick dry-grey fibrous bark. *Leaves* crowded at the ends of branches 4·5-12 by 1·5-4 in., oblong or obovate-lanceolate, bluntly acuminate, entire but often with wavy margins, coriaceous, glabrous, mature, dark glossy green, pinkish when very young, turning yellow before falling; main lateral nerves strong, about 20 on either half, often with a few intermediate ones, arched, vanishing at the margins; base acute; petiole 1-2·5 in. long, swollen at the base. *Panicles* about 12 in. long, conical in outline, pubescent throughout; bracts elliptic, concave, deciduous. *Flowers* about .15 in. across, greenish-yellow, scented, male and bi-sexual on the same panicle. *Calyx* 4-5-partite; segments imbricate, ovate, concave, pubescent outside, deciduous. *Petals* 4-5, imbricate, much longer than the calyx-segments, ovate, pale-yellow with 3-5 longitudinal ridges. *Disk* fleshy. *Stamens* 4-5, inserted on the disk, only one perfect and much larger than the rest; filaments of fertile stamens subulate, others filiform. *Ovary* sessile, obliquely seated, ovoid, glabrous; ovule solitary; style sub-lateral, declining towards the fertile stamen. *Drupe* 2-4-up to 8 in. or more in cultivated forms—long, ovoid or globose, laterally compressed with a 'nose' on the ventral side near the tip indicating the position of the style, fleshy, generally yellow when ripe; mesocarp more or less stringy, aromatic, sharply acid to sweet when ripe; stone compressed, longitudinally furrowed, fibrous.

Cultivated throughout the province, also undoubtedly indigenous in the evergreen tracts of both valleys.

The wood is grey light and coarse-grained but does not warp or split much. It is therefore found fit for planks and packing cases. Weight about 40 lbs. per c. ft. The ripe fruit so much prized in other provinces, is however of little value in Assam owing to attacks of insects of various kinds.

Fls. 2-3. Fr. 5-7.

2. *Mangifera sylvatica* Roxb. Vern. *Bon-am*, Ass.; *Lakshmi-am*, Sylh. & Cach.; *Huibamin*, Tipp.; *Chuchi-am*, Nep.

A lofty evergreen tree with a dense globose crown. *Bark* brownish-grey; inside greenish yellow, the inner layers exuding a white gum. *Leaves* scarcely distinguishable from those of the mango tree, excepting that they are as a rule proportionately narrower and longer-petioled; main lateral nerves up to 25 on either half. *Panicles* much larger and with ascending slender glabrous ramifications. *Flowers* pinkish-white, on glabrous pedicels. *Calyx* 5-lobed, very small. *Petals* 5, oblong, twistedly imbricate. *Disk* slightly grooved, villous. *Stamen* solitary, inserted in the cavity of the disk. *Ovary* obliquely oval; style subulate. *Drupe* 3-4 in. long, ovate, obliquely tapering acuminate so as to be often hooked, very slightly compressed; stone less firm, less fibrous and less furrowed than of the mango; embryo ascending, radicle turned upward along the edges of the cotyledons.

Sporadic in the evergreen forests of UPPER ASSAM and the SURMA VALLEY.

The unripe fruit is more pleasantly aromatic than the mango and is very suitable to be made into jarts, pickles and jellies but the ripe fruit is very inferior. The timber is of the same quality as that of the mango tree, but has been found unsuitable for tea-boxes.

Fls. 9-10. Fr. 1-3.

3. *Mangifera andamanica* King in Journ. As. Soc. Beng. 65 (1897), 470.

Apparently only a small or middle-sized tree. *Bark* dark-brown, not so rough as of the other two species. *Leaves* 3-9 by 1-3.5 in., obovate, obtuse or bluntly acuminate, entire, thinly coriaceous, quite glabrous, concolor and shining on both surfaces; lateral nerves 10-12 on either half, not so strong as in the other two species, very oblique, somewhat straggling, tertiary nerves conspicuously reticulate. *Panicles* shortly peduncled. *Flowers* tetramerous, pedicelled. *Drupe* 1.5-2.5 by 1-1.5 in., oval blunt, compressed; pulp thin; stone large, rugose, finely tomentose.

Extremely rare, only once found by the writer at the foot of the Mikir hills near Barpathar, SIBSAGAR.

Fls. 9-10. Fr. 1-2.

4. HOLIGARNA Lam.

Holigarna longifolia Roxb. Vern. *Jhaw*, Sylh.; *Phol-hoi* or *Pholoi-kung*, Tipp.; *Hlang-phalan*, Kuki; *Bonsu-buphang*, Kach.; *Kherai*, Manip.; *Ng-gai*, Naga; *Kalebel*, Lush.

A lofty tree up to 100 ft. in height, with spreading branches, widely buttressed at the base; buds densely silky pilose. *Bark* grey outside, white or light red inside, exuding a caustic milky juice which turns black after exposure. *Leaves* densely crowded at the ends of the branchlets, 12-24 by 3-5.5 in., cuneiform-oblongate, thinly coriaceous, abruptly acuminate, usually entire, glabrous, glaucous beneath; midrib stout; lateral nerves about 25 on either half, straight but suddenly up-turned at the extremity, sometimes ending in few coarse teeth; petiole 2-3 in. long, usually with 2-4 incurved spurs 5-1 in. long. *Flowers* small, bracteate, polygamo-dioecious, 5-merous, dull-white, rusty tomentose, in axillary panicles 7-15 in. long with spreading branches; bracts linear; pedicels very short, elongating in fruit. *Calyx* rather sharply pentagonous, rusty tomentose, lobes minute. *Petals* 5, almost free, spreading, oblong, hairy. *Filaments* 5, shorter than the petals, much shorter in the female flowers, on the edge of the disk. *Disk* lining the calyx-tube in male flowers. *Ovary* inferior, compressed, hairy; styles 3, recurved; ovule solitary, pendulous. *Drupe* enclosed by the calyx-tube, about 1 in. long, ovate-oblong, slightly compressed; mesocarp with large cells filled with an acrid juice; cotyledons equal.

Fairly common in the evergreen forests of CACHAR and south-eastern part of SYLHET.

Wood light-grey, soft, very light, weighing about 25 lbs. per c. ft.

The acrid juice is used as a Varnish.

Fls. 12-1. Fr. 5-6.

Var. *Helfri* Hk. f. (sp). Young shoots pubescent. *Drupe* exposed at the top. Our form appears to be intermediate between *H. longifolia* Roxb and *H. Helfri* Hk. f. I am inclined to regard this as a variety of *H. longifolia*. Katakhal reserve, CACHAR.

5. DRIMYCARPUS Hk. f.

Drimycarpus racemosus Hk. f. Vern. *Amsia*, Ass. (Lakh.); *An-selenga*, Ass. (Darr.); *Dieng-borrah*, *Dieng-kain*, Khasi (Cherra-side); *Dieng-soh-rany*, *Dieng-kabra*, Synt.; *Babari*, Garo (Tura); *Khati*, Garo (Damra); *Bol-thekachau*, i. e., wild mango, Garo (Dambu); *Bombal* (Lush.)

A fairly large tree up to 80 ft. in height and 7 ft. in girth. *Bark* corky, rather rough, grey outside, reddish-brown inside, granular, exuding from the inner layers a thin watery acrid sap which turns black after exposure. *Leaves* somewhat resembling those of the mango tree, 4-10 by 1.5-2.5 in., oblong-lanceolate or oblanceolate, abruptly acuminate, quite entire, coriaceous, glabrous, shining above, glaucous beneath; lateral nerves 18-24 on either

half of the midrib, very prominent and shining beneath, slightly arched; tertiary nerves reticulate; base cuneate; petiole '5-7 in. long, stout, channelled above, not spurred. *Flowers* white, about '1 in. across; males sessile, females on slender puberulous pedicels, in axillary, fascicled, pubescent, racemose panicles, often below the leaves and usually shorter than them. *Calyx* superior; lobes 5, oblong-acute, imbricate. *Petals* 5, orbicular or ovate, imbricate. *Stamens* 5; filaments short, inserted at the base of the annular disk. *Ovary* inferior, 1-celled, 1-ovuled; style 1. *Drupe* about 1 by '6 in., transversely oblong or ovoid, surmounted by the remains of the calyx, dark glossy green with minute yellowish dots while young, red when fully ripe. *Cotyledons* equal, plano-convex.

In shady places, often along streams, throughout the PROVINCE and up to 4,000 ft. in the HILLS.

Wood yellowish grey, but liable to be discoloured, close-grained, moderately hard, medullary rays fine, joined by very fine transverse lines. Said to be used for canoes and planking. According to Gamble it is the wood most employed for boats in Chittagong.

Figs. 9-11. Fr. 11-4.

6. LANNEA A. Rich.

(Odina Roxb).

Lannea grandis A. Rich. Syn. *Odina Wodier* Roxb. Sans. *Jingni*. Vern. *Jia*, Ass., Beng., & Mech., *Jiyal*, Beng. (Sylh.); Kai-engla, Khai-engla, Sylh. (perhaps wrongly); *Adalia Poma*, Madabai or Mandamai, Cach.; *Dieng-thang*, *Dieng-soh-knurnot* (Burnihat), *Dieng-sur*, *Dieng-khang*, *Dieng-pasoh-pier* (Shella), *Dieng-tang-leng*, *Soh-lapeit-synrang*, Khasi; *Dume*, *Dome*, *Bol-chigamba*, *Bol-agru*, Garo; *Thing-khoi-nath*, Kuki; *Toi-sing-taite*, Tipp.; *Jika*, *Jiya*, Jharua; *Hulurhe*, Nep.; *Tiji-arong*, Mik.

A small to middle sized deciduous tree with thick branchlets. *Bark* thick, grey or greyish black, smooth and slightly wrinkled when young, afterwards rough and fissured, exfoliating in thin round plates, exposing a greyish or pinkish-white surface; blaze red, streaked with irregular white or pink streaks, fibrous. *Young parts* and inflorescence deciduous stellate-pubescent or almost tomentose. *Leaves* crowded at the ends of branches, alternate, 12-18 in. long, imparipinnate; common petiole terete. *Leaflets* 5-11, opposite, shortly petiolulate or nearly sessile, 3-6 by 2-3'5 in., ovate, elliptic or lanceolate, acuminate; base often oblique, rather membranous, often slightly puberulous when young, glabrous with age; lateral nerves 6-10—sometimes more, on either side of mid-rib, petiolule upto '1 in. *Flowers* small, '15-'12 in. across, yellowish-green, usually dioecious, rarely monoecious, 4-rarely 5-merous, fascicled on the branches of slender racemes, which are crowded at the ends of branches; *males* usually longer and compound, *females* usually simple, elongating in fruit.

Calyx imbricate in bud, persistent in female flowers, ovate, ciliate. *Petals* about twice the calyx lobes or longer, '1-12 in. long, usually purplish in the middle, imbricate in bud, spreading, oblong, acute in the male flowers, longer and obtuse in female flowers. *Disk* annular, 8-lobed. *Male flowers* :—stamens usually 8, rarely 10 (?) inserted on the margin of the disk; pistillode 4-rarely 5-cleft. *Female flowers* :—staminodes small; ovary 4-6 lobed, 1-celled; styles 3-6 short; stigma papillose; ovule solitary, pendulous from the apex. *Drupe* upto '6 in. long, usually red when ripe, seated on the somewhat enlarged calyx, curved, oblong, laterally somewhat compressed; stone large, pitted.

Common throughout the Province, specially in deciduous types of forests, but not recorded from the N. E. FRONTIER DISTRICT, ascending to 3000 ft. in the hills.

Sapwood white, soft and perishable. Heartwood red when fresh cut turning to reddish brown after exposure, much prized in Sylhet for posts. Weight 50-60 lbs. per c. ft. A useful gum can be obtained by making cuts in the sapwood. The leaves are greedily eaten by cattle and elephants are fond of the young shoots. The tree can be most easily propagated by cuttings of all sizes, and live house-posts are a very common sight in Bengal villages.

Fls. 3-4 Fr. 4-6. New leaves 5-6. Leaves turn yellow before falling.

7. TAPIRIA Juss.

Tapiria hirsuta Hk. f. Vern. *Dhindau-baguri lata*, Ass. (Darr.); *Midi-takkir*, Miri & Abor; *Du-cheng-brup*, Garo; *Hang-Ding*, Mik.; *Chutti-lara*, Nep.

A fairly heavy scandent shrub, hirsute or villous throughout. *Bark* black on mature stems, peeling off in strips exposing a brown surface, greenish brown inside. *Leaves* imparipinnate, 8-15 in. long; common petiole terete, villous. *Leaflets* 11-15, lateral opposite, 1-4 by '5-1.5 in., ovate oblong or lanceolate, acuminate, distantly crenulate-serrate, membranous, tomentose hirsute or strigose, more densely on the under surface; lateral nerves 6-9 on either half, slender, evenly arched; base rounded or subcordate, more or less oblique; petiolules '1-2 in. long. *Panicles* axillary or sub-terminal, 5-12 in. long with spreading ramifications. *Flowers* polygamous, very small, white, sweet scented; pedicels capillary, '05-1.5 in. long, nearly glabrous. *Calyx* 5-lobed, persistent, lobes ovate. *Petals* 5, oblong or elliptic oblong, imbricate. *Disk* yellow, 5-lobed. *Stamens* 10, inserted at the base of the disk; anthers globose. *Ovary* 5-lobed, each lobe with a style, but 1-celled and 1-ovuled. *Drupe* about '3 by '25 in., obliquely oblong, black when ripe with a subacid aromatic flesh; stone rugose; crustaceous.

Throughout the PROVINCE ascending to 4,000 ft. in the Hills, generally in scrub forest and on old jhums.

The Mikirs eat the leaves as a vegetable. The ripe fruit is eaten. The Garos use the juice of the plant to dress cuts and other wounds probably as an antiseptic.

Fls. 1-3. Fr. 4-5.

8. SPONDIAS Linn.

Glabrous trees. *Leaves* imparipinnate, usually crowded at the ends of the branchlets; leaflets opposite or subopposite. *Flowers* small, polygamous, generally in large terminal panicles. *Calyx* inferior, small, 4-6-fid; lobes slightly imbricate. *Petals* 4-6, subvalvate, spreading. *Disk* cup-shaped, thick, slightly lobed. *Stamens* 8-10, inserted beneath the disk. *Ovary* superior, 4-6-celled, each cell with a solitary pendulous ovule; styles 4-6, conniving or erect. *Drupe* large, fleshy, terete with a 1-6-celled hard stone; cotyledons elongate, radicle superior.

Leaflets broad, abruptly acuminate, always entire with a strong intramarginal nerve. Flowers congested, subsessile. Drupe 1.5-2 in. long. Leaflets narrow, tapering acuminate, serrate on young shoots, with no intramarginal nerves. Flowers scattered on long filiform pedicels. Drupe scarcely exceeding 1 in. in length.

.. 1. *S. mangifera*.

.. 2. *S. axillaris*.

1. *Spondias mangifera* willd. Sans. *Amrataka*. Vern. *Amor*, *Amora*, *Amratenga*, Ass.; *Amra*, Beng. *Dergi-asing*, Miri & Abor; *Thaisudi-phang*, Kach.; *Suming*- or *Chiming-arong*, Mik.; *Dieng-soh-pair* (pyjer or -pier) *Dieng-soh-pair-kantha*; Khasi; *Ambri-thong*, *Ambi-thong*, *Thong-rong*, Garo; *Tamxan*, Naga; *Heining*, Manip.; *Tui-to-thing*, *Toito*, Kuki.

A middle-sized tree with a pleasant aromatic smell. *Bark* brown or grey, plain but often with horizontal wrinkles and light vertical fissures, soft; inside reddish-brown with vertical streaks of lighter colour, .25-.3 in. apart. *Leaves* 1-1.5 ft. long; common petiole terete, slender. *Leaflets* 9-13, 2-9 by 1-4 in., elliptic-oblong, always quite entire, abruptly long acuminate, membranous, shining, lateral more or less oblique, turning yellow before falling; lateral nerves 10-30 on either half, straight, parallel; nearly transverse, joined by a strong intramarginal nerve; petiolules about .2 in. long. *Flowers* polygamous, .2 in. across, scented, subsessile, in spreading terminal panicles. *Calyx* salver-shaped with 5-6 acute lobes which are deciduous. *Petals* as many as calyx-lobes, greenish-white, about .1 in. long, ovate-oblong, acute, glabrous. *Disk* broad, fleshy, usually 5-lobed. *Stamens* twice the number of petals; filaments short, subulate; anthers versatile. *Ovary* of 4-6 carpels which are free above, each with a short conniving style. *Drupe* 1.5-2 in. long, ovoid or oblong, greenish-yellow when ripe; pulp soft, acid, aromatic; stone semi-woody, fibrous with many cavities outside, 1-5 celled, cells opening by cavities through the top of the stone; seeds 1-5 of which, however, not more than 1-3 are perfect.

Throughout the plains in both the VALLEYS and up to 3,000 ft. in the HILLS, generally affecting deciduous forests or open spots.

Wood soft, light-grey, very porous, weighing about 26 lbs. per c. ft., of no use. The tree is often attacked by insects and from the holes made by

them a gum exudes which is insoluble in water. The fruit is eaten when ripe, also pickled or made into curries when green and tender. The aromatic flower-buds also make a very agreeable curry. The trees can be very easily propagated from cuttings.

Leafless 12-3. Fls. 5-5. fr. 11-2.

2. *Spondias axillaris* Roxb. Vern. *Khamoli-sali*, *Khamoli-mola*, Ass. (Sibs.); *Hamoi-tenga*, Ass. (Darr.); *Belam-asing*, Abor & Miri; *Belam-changne*, Duff.; *Theseli-arong*, Mik.; *Amung-gok*, *Amung-gok*, *Aqimmok*, Garo; *Dieng-salait*, Synt.; *Nihor*, Jharua (Dalu, Garo Hills); *Labshi*, Nep.

Usually a small evergreen tree attaining in favourable localities about 80 ft. in height and 7 ft. in. girth, with thin horizontal branches. *Bark* on branches and young plants greenish-brown, plain and shining but with large warts; on old stems dark-grey to black, reticulately fissured and splitting in thin long strips; inside light-red in thin concentric plates. *Leaves* 12-18 in. long; common petiole terete, slender. *Leaflets* 7-17, generally opposite, 2-4 by 7-15 in., ovate, lanceolate or oblong-lanceolate, caudate or acuminate; base cuneate to rounded, oblique on the leaflets,—from distantly but deeply serrate on young plants, to subentire on mature trees, membranous, puberulous on the nerves and along the margin when young, glabrous with age except for tufts of hair on the axils of nerves beneath, undersurface pale; main lateral nerves 10-12 on either half, joined by an intramarginal nerve, tertiary nerves very fine, closely reticulate; petiolules slender, slightly channelled, lateral —1-2 in., terminal 5-8 in. long. *Flowers* polygamous, pentamerous, greenish-white. MALE FLOWERS—15 in. across in panicles 3-6 in. long, usually crowded towards the base of the shoots, axillary and extra-axillary, panicle branches slender; pedicels up to 1 in. long, filiform. *Calyx* cup-shaped, lobes elliptic or ovate, ciliate. *Petals* elliptic. *Stamens* 10; filaments slightly subulate, short; anthers large, oblong; disk rather obscure, pistillode 0. HERMAPHRODITE or FERTILE FLOWERS—25 in. across, solitary on stout peduncles up to 6 in. long or on short few flowered racemes; pedicels up to 25 in. long. *Stamens* 10; disk annular, 10 lobed. *Ovary* 5 celled with 5 erect styles. *Drupe* 1-12 by 8 in., oblong, yellow when ripe, flesh fibrous, white when ripe, very acid, stone 6-8 by 3-5 in., horny, shallow-pitted all over and with 5 prominent depressions at the top, 5 celled; seeds with membranous testa and oily cotyledons.

Common in all submontane tracts and up to 4,000 ft. in the HILLS, though somewhat rare in the Sadar Sub-Division of the KHASI HILLS. Very common in some parts of the GARO, JAINIA and NORTH CACHAR HILLS.

It appears from King and Prain's description in *Annals of Royal Botanic Garden, Calcutta*—Vol. IX. p. 25, that the plants examined by them bore no male flowers, and the plants raised from seeds in the Botanic Gardens bore only hermaphrodite flowers. The forms producing male flowers should be further examined in the field for correlated difference.

The wood is greyish-white, soft and light, not of much use. The inner bark is chewed by most hill-people and certain classes of Assamese as a substitute for Areca-nut. The ripe fruit is eaten.

Fls. 2-4. Fr. 7-12.

FAM 48. MORINGACEÆ.

Deciduous trees with corky bark and soft spongy wood. *Leaves* alternate, imparipinnate, twice or thrice compound; leaflets opposite, entire; stipules 0. *Flowers* 2-sexual, irregular, whitish or pinkish, in axillary and terminal panicles. *Calyx* cup-shaped; segments 5, petaloid. *Petals* unequal, erect, spreading. *Disk* thin, lining the calyx tube. *Perfect stamens* 5, opposite the petals, alternating with 5 antherless filaments, all inserted on the edge on the disk and all declinate; anthers 1-celled. *Ovary* stalked, lanceolate, 1-celled; ovules numerous on parietal placentas; style slender. *Fruit* a pod-like capsule, rostrate, 3-angled, 3-valved. *Seeds* many, usually winged; albumen 0.

MORINGA Lamk.

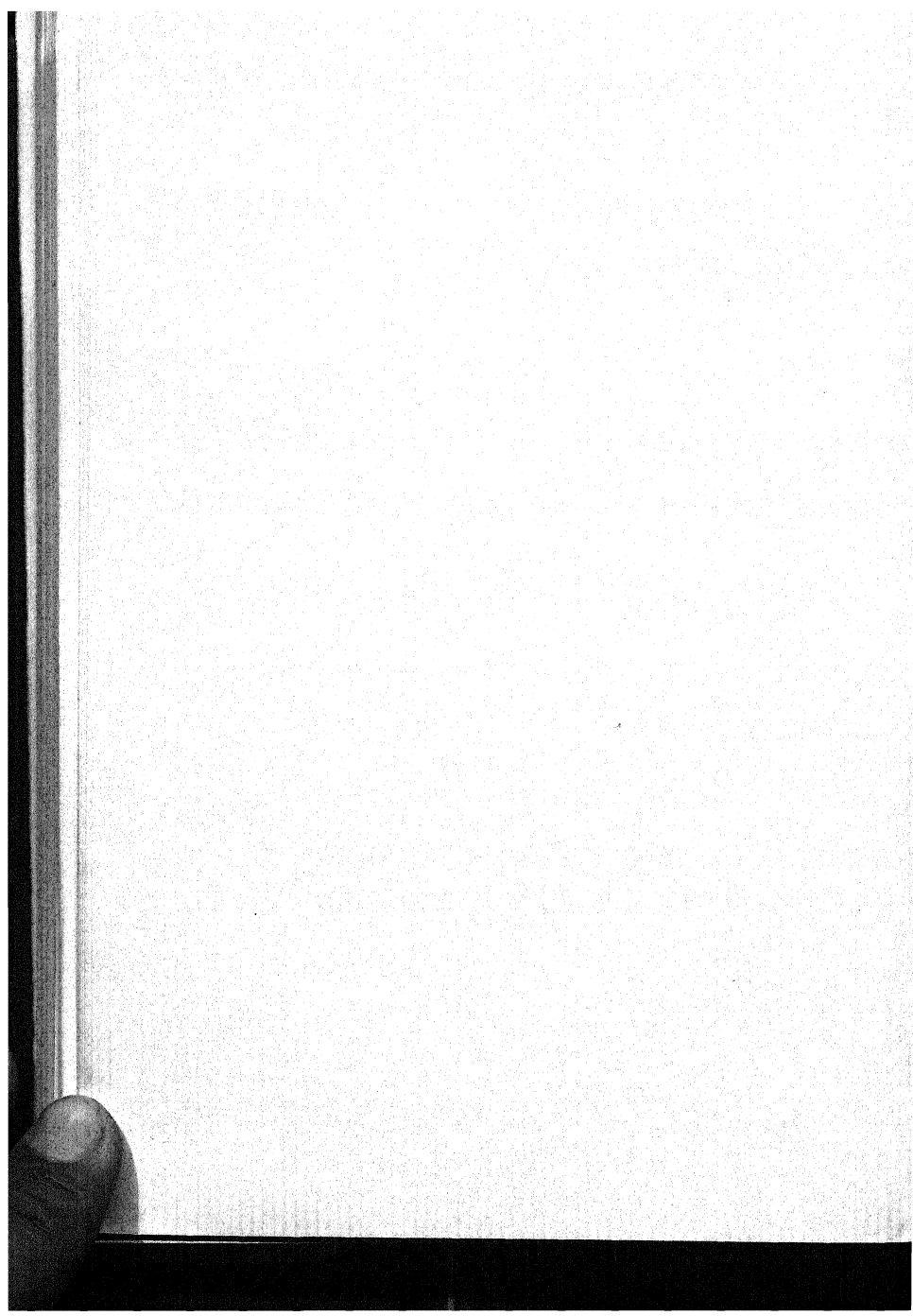
Moringa pterygosperma Gertn. Vern. *Saijna*, *Sohjna*, Beng. & Hind., *Sajina*, Ass.

A middle-sized tree with thick corky bark, the inner layers exuding a red resinous gum; roots pungent. *Leaves* 1-2.5 ft. long, usually 3-pinnate; petiole sheathing at the base; pinnæ 4-6 pairs, opposite; pinnae 6-9 pairs, opposite, the uppermost pair 1-foliate, a hairy gland between each pair of pinnæ and pinnulae. *Leaflets* 4-8 in. long, ovate or elliptic, entire, membranous, pale beneath; veins invisible. *Flowers* 1 in. across, strongly honey-scented. *Sepals* petaloid, linear-lanceolate, reflexed. *Petals* linear-spatulate, white but with yellow dots above near the base. *Filaments* villous. *Ovary* hairy. *Capsule* 9-20 by 6-8 in., 3-gonous, longitudinally ribbed, slightly constricted between the seeds. *Seeds* 3-gonous, winged along the corners, about 1 in. long including the wings.

Planted in homesteads and almost universally in coolie lines in tea gardens of both VALLEYS chiefly for the fruits which are used as a vegetable. The tender leaves and flowers are also eaten cooked. The pungent roots, bark and gum are used medicinally. Wood very soft and very porous, absolutely useless.

Fls. 1-3. Fr. 3-5.

INDEX



GENERAL INDEX

OF

VOLUME I

FAMILIES, GENERA AND SPECIES.

A

	Part	Page		Part	Page
<i>Abroma Jacq.</i>	I.	156	<i>distachys</i>	II.	315
<i>angusta Linn.</i>	I.	156	<i>glaber</i>	II.	315
<i>Abutilon Gertn.</i>	I.	140	<i>grandifolia</i>	II.	315
<i>indicum G. Don.</i>	I.	140	<i>longipes Radlk.</i>	II.	315
ACERACEÆ	II.	310	<i>Rheedii</i>	II.	315
<i>Acer Linn.</i>	II.	310	<i>subfalcatus Radlk.</i>	II.	316
<i>laevigatum Wall.</i>	II.	312	<i>zeylanicus Linn.</i>	II.	315
<i>niveum Bl.</i>	II.	311	Alphonsea		
<i>oblongum Wall.</i>	II.	311	<i>Hk. f. & Th.</i>	I.	38
<i>Aconitum</i>	I.	9	<i>lutea Hk. f. & Th.</i>	I.	39
<i>Acronychia Forst.</i>	II.	203	<i>ventricosa</i>		
<i>laurifolia Bl.</i>	II.	203	<i>Hk. f. & Th.</i>	I.	39
<i>Acinidia Lindl.</i>	I.	130	Alsodeia Thouars.	I.	82
<i>callosa Lindl.</i>	I.	130	<i>bengalensis Wall.</i>	I.	82
<i>Adinandra Jack.</i>	I.	117	<i>racemosa</i>		
<i>Griffithii Dyer.</i>	I.	117	<i>Hk. & Th.</i>	I.	83
<i>Ægle Corr.</i>	II.	215	<i>Roxburghii Wall.</i>	I.	82
<i>Marmelos Correa.</i>	II.	215	Amoora Roxb.	II.	235
Æculis Linn.	II.	313	<i>Chittagonga</i>		
<i>puuduana Wall.</i>	II.	313	<i>Hiern.</i>	II.	237
<i>Aglala Lour.</i>	II.	238	<i>cucullata Roxb.</i>	II.	236
<i>edulis A. Grey.</i>	II.	239	<i>Rohituka W & A</i>	II.	236
<i>khasiana Hiern.</i>	II.	238	<i>spectabilis</i>		
<i>odoratissima Bl.</i>	II.	238	<i>F. B. I.</i>	II.	237
<i>perviridis Hiern.</i>	II.	239	<i>Wallichii King.</i>	II.	237
<i>Roxburghiana</i>			AMPELIDACEÆ	II.	287
<i>Miq.</i>	II.	238	<i>Ampelocissus</i>		
<i>Wallichii Hiern.</i>	II.	240	<i>divaricata Planch.</i>	II.	294
<i>Ailanthus Desf.</i>	II.	216	<i>latifolia Planch.</i>	II.	293
<i>grandis Prain.</i>	II.	216	<i>rugosa Planch.</i>	II.	294
<i>Allophylus Linn.</i>	II.	314	<i>sikkimensis</i>		
<i>Aporetica</i>	II.	315	<i>Planch</i>	II.	294
<i>assamica</i>	II.	315	ANACARDIACEÆ	II.	330
<i>Cobbe Bl.</i>	II.	315	<i>Anacolosia</i>		
			<i>ilicoides Mast.</i>	II.	250

	Part	Page		Part	Page
Anamirta Colebr.	I.	55	Averrhoa Linn.	II.	192
paniculata			Carambola Linn.	II.	192
Colebr.	I.	55	Azadirachta		
ANCISTROCLADACEÆ	I.	138	A. Juss.	II.	227
Ancistrocladus			indica A. Juss.	II.	227
Wall.	I.	138			
extensus Wall.	I.	139			
Wallichii					
Planchon	I.	138	B		
Anemone Linn.	I.	6	Balsamodendron		
elongata Don.	I.	7	Roxburghii Arn.	II.	225
rivularis Hom.	I.	7	BERBERIDACEÆ	I.	59
Anisadenia Wall.	II.	186	Berberis Linn.	I.	61
pubescens Griff.	II.	187	microcarpa	I.	61
saxatilis Wall.	II.	186	nepalensis Spreng	I.	61
ANONACEÆ	I.	29	Wallichiana D.C.	I.	61
Anona Linn.	I.	43	Berchemia Neck	II.	283
reticulata Linn.	I.	43	floribunda Wall	II.	283
squamosa Linn.	I.	43	Bixa Linn.	I.	83
Aphania Bl.	II.	321	Orellana Linn.	I.	83
Danura Radlk.	II.	322	BIXACEÆ	I.	83
rubra Radlk.	II.	321	Bocagea Dalzelli		
Apodytes Meyer	II.	251	Hk. f. & Th.	I.	42
Benthamina			Bombax Linn.	I.	147
Wight.	II.	251	insigne Wall	I.	147
AQUIFOLIACEÆ	II.	252	malabaricum D.C.	I.	147
Argemone Linn.	I.	66	Brasenia Schreber	I.	63
mexicana Linn.	I.	66	peltata Pursh	I.	63
Artabotrys R. Br.	I.	46	Brassica Linn.	I.	69
caudatus Wall.	I.	49	compestris Linn.	I.	69
Aspidocarya			dichotoma Prain.	I.	69
Hk. f. & Th.	I.	53	erucoides Roxb.	I.	69
uvifera			juncea Hk. f. & Th.	I.	69
Hk. f. & Th.	I.	53	napus Linn.	I.	69
Aspidopterys			oleracea Linn.	I.	69
A. Juss.	II.	189	sarson Prain.	I.	69
elliptica A. Juss.	II.	190	Brucea Mill	II.	218
glabriuscula			mollis Wall	II.	218
Wall.	II.	189	sumatrana Roxb.	II.	218
lanuginosa Wall.	II.	190	Buettneria Linn.	I.	150
nutans Hk. f.	II.	190	aspera Colebr. I.		160
nutans Wall.	II.	190	pilosa Roxb	I.	160
oxyphylla			Bursera Linn.	II.	223
A. Juss.	II.	191	serrata Colebr.	II.	223
Atalantia Correa.	II.	210	BURSERACEÆ	II.	221
caudata Hk. f.	II.	210			
monophylla					
Correa.	II.	210			
sp.	II.	210			
			C		
			Calophyllum Linn.	I.	114
			polyanthum Wall.	I.	114

	Part	Page		Part	Page
Camellia Linn.	I.	121	Mannii C. DC.	II.	244
caduca C. B. Clarke			microcarpa C. DC.	II.	244
Mss.	I.	123	Toona Roxb.	II.	242
caudata Wall.	I.	122	CELASTRACEÆ	II.	260
drupifera Lour.	I.	123	Celastrus Linn.	II.	267
Kissi Wall.	I.	123	Championii		
Mastersi Griff.	I.	123	Benth.	II.	269
theifera Griff.	I.	122	membranifolia		
Canarium Linn.	II.	224	Prain.	II.	270
bengalense Roxb.	II.	224	monosperma Roxb.	II.	269
resiniferum Brace	II.	224	paniculata Willd.	II.	268
CAPPARIDACEÆ	I.	72	stylosa Wall.	II.	268
Capparis Linn.	I.	75	venulosa Wall.	II.	269
assamica Hk. f. & Th.	I.	76	venulosoides	II.	268
horrida Linn. f.	I.	77	Chaillietia DC.	II.	245
multiflora Hk. f.			gelonoides Bedd.	II.	245
and Th.	I.	76	sumatrana Miq.	II.	245
olacifolia Hk. f.			CHAILLETIACEÆ	II.	245
& Th.	I.	77	Chickrassia		
pumila Champion	I.	76	Andr. Juss.	II.	241
sabiaefolia Hk. f. & Th.	I.	78	tabularis		
tenera Dalz.	I.	78	Andr. Juss.	II.	241
viminea Hk. f. & Th.	I.	78	Chisocheton Bl.	II.	234
Cardamine Linn.	I.	70	paniculatus Hiern.	II.	234
debilis Don.	I.	70	Cimicifuga.	I.	9
hirsuta Linn.	I.	70	Cissampelos Linn.	I.	52
sylvatica Linn.	I.	70	Paireire Linn.	II.	52 & 53
Cardiopteris lobata			Cissus adenata Roxb.	II.	291
R. Br.	II.	254	assamica		
Cardiospermum			Craib nov. Comb.	II.	291
Linn.	II.	313	discolor Bl.	II.	290
Halicacabum Linn.	II.	313	dispersa Hutch.	II.	292
Casearia Jacq.	I.	91	elongata Roxb.	II.	297
esculenta Roxb.	I.	93	latifolia Vahl.	II.	292
glomerata Roxb.	I.	92	quadrangularis		
graveolens Roxb.	I.	93	Linn.	II.	290
Kurzii C. B. Clarke	I.	94	repanda Vahl.	II.	292
vareca Roxb.	I.	93	repens Lamk.	II.	290
Cayratia carnosa			Citrus Linn.	II.	212
Gagnepain.	II.	295	Aurantium Linn.	II.	214
japonica Gagnep.	II.	301	decumana Linn.	II.	215
pedata Juss.	II.	302	Hystrix DC.	II.	214
tenuifolia Gagnep.	II.	300	ichanguensis		
Cedrela Linn.	II.	242	Swingle.	II.	214
assamensis			medica Linn.	II.	213
C. B. Clarke.	II.	243	Clausena Burn.	II.	206
febrifuga C. DC.	II.	243	excavata Burn.	II.	206
			heptaphylla		
			W. & A.	II.	206

	Part	Page
Dysoxylum <i>Bl.</i>	II.	230
binectariferum		
<i>Hk. f.</i>	II.	232
grande <i>Hiern.</i>	II.	232
Hamiltonii <i>Hiern.</i>	II.	231
pallens <i>Hiern.</i>	II.	233
procerum <i>Hiern.</i>	II.	231
reticulatum <i>King.</i>	II.	233

E

Echinocarpus <i>Bl.</i>	I.	182
assamicus <i>Benth.</i>	I.	182
dasycaarpus <i>Benth.</i>	I.	183
Sigun <i>Blume.</i>	I.	183
tomentosus <i>Benth.</i>	I.	183
ELAEOCARPACEÆ	I.	170
Ekeocarpus <i>Linn.</i>	I.	170
acuminatus <i>Wall.</i>	I.	177
aristatus <i>Roxb.</i>	I.	177
Braceanus <i>Wall.</i>	I.	177
bracteatus <i>Kurz.</i>	I.	182
floribundus <i>Bl.</i>	I.	173
Ganitrus <i>Roxb.</i>	I.	172
hygrophilus <i>Kurz.</i>	I.	176
integer <i>Wall.</i>	I.	181
lanceifolius <i>Roxb.</i>	I.	175
lucidus <i>Roxb.</i>	I.	174
Monoceros <i>Cav.</i>	I.	179
oblongus <i>Gaertn.</i>	I.	176
obtusus <i>Bl.</i>	I.	179
petiolatus <i>Wall.</i>	I.	181
prunifolius <i>Wall.</i>	I.	180
robustus <i>Roxb.</i>	I.	173
rugosus <i>Roxb.</i>	I.	178
sikkimensis <i>Mast.</i>	I.	174
sp.	I.	176
staffianus <i>Gagnep.</i>	I.	179
Varunna <i>Ham.</i>	I.	180
vestitus	I.	176
Wallichii <i>Kurz.</i>	I.	174
Eriodendron anfractuosum		
<i>DC.</i>	I.	148
Erioglossum <i>Bl.</i>	II.	316
edule <i>Bl.</i>	II.	316
rubiginosum <i>Bl.</i>	II.	316
Eruca <i>Tourn.</i>	I.	69
sativa <i>Lamk.</i>	I.	69
Erythralpalum <i>Bl.</i>	II.	248

	Part	Page
scandens <i>Bl.</i>	II.	248
vagum <i>Mast.</i>	II.	248
Erythroxyton <i>Linn.</i>	II.	187
Kunthianum <i>Wall.</i>	II.	187
Euonymus <i>Linn.</i>	II.	261
attenuatus <i>Wall.</i>	II.	262
bullatus <i>Wall.</i>	II.	263
cinerens <i>Lawson.</i>	II.	265
echinatus <i>Wall.</i>	II.	265
frigidus <i>Wall.</i>	II.	265
grandiflorus <i>Wall.</i>	II.	262
Hamiltonianus		
<i>Wall.</i>	II.	263
Lawsonii <i>C. B.</i>		
<i>Clarke & Prain.</i>	II.	263
macrophylla	II.	264
thæcfolius <i>Wall.</i>	II.	264
vagans <i>Wall.</i>	II.	264
Eurya <i>Thunb.</i>	I.	124
acuminata <i>DC.</i>	I.	125
euprista <i>Korths.</i>	I.	125
japonica <i>Thunb.</i>	I.	124 & 125
nitida <i>Korths.</i>	I.	125
phyllanthoides <i>Bl.</i>	I.	125
symplocina <i>Bl.</i>	I.	126
trachyacarpa <i>Korth.</i>	I.	126
Wallichiana <i>Stend.</i>	I.	125
Euryale <i>Salisb.</i>	I.	65
ferox <i>Salisb.</i>	I.	65
Evodia <i>Forst.</i>	II.	193
fraxinifolia <i>Hk. f.</i>	II.	196
melæfolia <i>Benth.</i>	II.	195
Roxburghiana		
<i>Benth.</i>	II.	194
rutæcarpa		
<i>Hk. f. & Thom.</i>	II.	196
triphylla <i>DC.</i>	II.	195

F

Flacourtia <i>Commers.</i>	I.	88
Cataphracta <i>Roxb.</i>	I.	89
inermis <i>Roxb.</i>	I.	90
sepiara <i>Roxb.</i>	I.	89
sumatrana <i>Planch.</i>	I.	90
FLACOURTIACEÆ	I.	84
Fumaria <i>Linn.</i>	I.	68
parviflora <i>Lamk.</i>	I.	68
FUMARIACEÆ	I.	66

	Part	Page		Part	Page
G					
<i>Garcinia Linn.</i>	I.	103	<i>elastica Royle.</i>	I.	163
<i>affinis Wall.</i>	I.	106	<i>helictrofolia Wall.</i>	I.	165
<i>anomala Planch.</i>	I.	109	<i>hirsuta Vahl.</i>	I.	165
<i>atroviridis Griff.</i>	I.	109	<i>laevigata Vahl.</i>	I.	164
<i>Cowa Roxb.</i>	I.	105	<i>Microcos Linn.</i>	I.	162
<i>elliptica Wall.</i>	I.	107	<i>multiflora Juss.</i>	I.	165
<i>kydia Roxb.</i>	I.	105	<i>nagensium Prain.</i>	I.	167
<i>lanceifolia Roxb.</i>	I.	106	<i>polygama: Masters.</i>	I.	165
<i>Morella Desr.</i>	I.	107	<i>sapida Roxb.</i>	I.	164
<i>pedunculata Roxb.</i>	I.	107	<i>scabrophylla Roxb.</i>	I.	166
<i>paniculata Roxb.</i>	I.	108	<i>sclerophylla Roxb.</i>	I.	166
<i>sp.</i>	I.	110	<i>Vestita Wall.</i>	I.	143
<i>spicata Hk. f.</i>	I.	110	<i>Vestita F.B.I.</i>	I.	163
<i>xanthochymus</i>			GUTTIFERÆ	I.	103
<i>Hk. f.</i>	I.	104	<i>Gymnosporia</i>		
<i>Garuga Roxb.</i>	II.	221	<i>W.&A.</i>	II.	271
<i>Gamblei King.</i>	II.	222	<i>acuminata Hk. f.</i>	II.	271
<i>pinnata Roxb.</i>	II.	221	<i>neglecta Wall.</i>	II.	272
<i>Glycosmis Correa.</i>	II.	205	<i>rufa Laws</i>	II.	271
<i>angustifolia Hk. f.</i>	II.	205	<i>salicifolia Lawson.</i>	II.	272
<i>arborea DC.</i>	II.	205	<i>Gynandropsis DC.</i>	I.	73
<i>longifolia Hk. f.</i>	II.	205	<i>pentaphylla DC.</i>	I.	73
<i>macrophylla Hk. f.</i>	II.	205	<i>Gynocardia R. Br.</i>	I.	87
<i>pentaphylla</i>			<i>odorata R. Br.</i>	I.	87&88
<i>Correa.</i>	II.	205	H		
<i>Glyptopetalum</i>			<i>Hæmatocarpus Miers.</i>	I.	57
<i>Thwaites.</i>	II.	266	<i>Thompsoni Miers.</i>	I.	57
<i>Griffithii Prain.</i>	II.	266	<i>Harpullia Roxb.</i>	II.	318
<i>Gamphandra Wall.</i>	II.	252	<i>Cupanoides Roxb.</i>	II.	318
<i>axillaris Wall.</i>	II.	252	<i>Helicteres elongata</i>		
<i>Goniothalamus Bl</i>	I.	37	<i>Wall.</i>	I.	156
<i>sesquipedalis</i>			<i>Heritiera Aiton</i>	I.	154
<i>Hk. f. & Th.</i>	I.	37	<i>acuminata Wall</i>	I.	155
<i>Simonsii</i>			<i>dubia Wall</i>	I.	156
<i>Hk. f. & Th.</i>	I.	37	<i>macrophylla Wall.</i>	I.	155
<i>Gordonia Ellis</i>	I.	121	<i>Heynea Roxb.</i>	II.	229
<i>excelsa Bl</i>	I.	121	<i>trijuga Roxb</i>	II.	229
<i>Gossypium Linn.</i>	I.	145	<i>Hibiscus Medik</i>	I.	142
<i>herbaceum Linn.</i>	I.	145	<i>Abelmoschus Linn.</i>	I.	143
<i>Gouania Linn.</i>	II.	286	<i>esculentus Linn.</i>	I.	144
<i>leptostachya DC.</i>	II.	286	<i>fragrans Roxb.</i>	I.	143
<i>Grewia Linn.</i>	I.	161	<i>macrophyllus Roxb.</i>	I.	142
<i>abutilifolia Juss.</i>	I.	165	<i>mutabilis Linn.</i>	I.	144
<i>asiatica Linn.</i>	I.	163	<i>pungens Roxb.</i>	I.	144
<i>aspera Roxb.</i>	I.	166	<i>radiatus Willd</i>	I.	144
<i>denticulata Wall.</i>	I.	167	<i>Rosa-sinensis Linn</i>	I.	145
<i>disperma Rottl.</i>	I.	163	<i>schizopetalus Hk. f.</i>	I.	145

	Part	Page		Part	Page
<i>surattensis</i> Linn	I.	144	<i>excelsa</i> Wall.	II.	257
<i>syriacus</i> Linn	I.	145	<i>fragilis</i> Hk. f.	II.	259
<i>Trionum</i> Linn	I.	143	<i>Godajam</i> Coleb	II.	256
HIPPOCRATEACEÆ	II.	272	<i>Griffithii</i> Hk. f.	II.	259
<i>Hippocratea</i> Korth.	II.	272	<i>sulcata</i> Wall.	II.	256
<i>arbores</i> Roxb.	II.	273	<i>thaeifolia</i> Hk. f.	II.	258
<i>indica</i> Roxb	II.	273	<i>Thomsonii</i> Hk. f.	II.	259
<i>macrantha</i> Korth	II.	274	<i>venulosa</i> Hk. f.	II.	257
<i>Hiptage</i> Gaertn.	II.	188	<i>Illicium</i> Linn	I.	27
<i>acuminata</i> Wall	II.	189	<i>Griffithii</i> Hk. f.		
<i>Madablota</i> Gaertn	II.	188	& Th.	I.	27
<i>Holboellia</i> Wall	I.	61	<i>Iodes</i> Baill.	II.	254
<i>latifolia</i> Wall.	I.	61	<i>Hookeriana</i> Baill	II.	254
<i>angustifolia</i>	I.	61	<i>Ixonanthes</i> Jack	II.	186
<i>Holigarna</i> Lam.	II.	337	<i>khasiana</i> Hk. f.	II.	186
<i>longifolia</i> Roxb.	II.	337			
<i>Homalium</i> Jacq.	I.	85			
<i>bhamoense</i> Cubit			K		
et Smith	I.	85&86	<i>Kadsura</i> Kämp.	I.	29
<i>Debbarmani</i>			<i>Roxburghiana</i> Arn.	I.	29
<i>Kanjilal. f.</i>	I.	85&86	<i>Kayea</i> Wall.	I.	112
<i>glabra</i>	I.	86	<i>assamica</i> King &		
<i>Schlichii</i> Kurz	I.	86	<i>Prair</i>	I.	113
<i>zeylanicum</i> Benth	I.	86	<i>floribunda</i> Wall	I.	113
<i>Hovenia</i> Thunb	II.	282	<i>Kurrimia</i> Wall	II.	270
<i>dulcis</i> Thunb	II.	282	<i>pulcherrima</i> Wall	II.	270
<i>Hydnocarpus</i> Gaertn	I.	87	<i>Kydia</i> Roxb.	I.	146
<i>Kurzii</i> Warb	I.	87	<i>calycina</i> Roxb	I.	146
HYPERICACEÆ	I.	100	<i>glabrescens</i> Mast.	I.	146
<i>Hypericum</i> Linn.	I.	100			
<i>breviflorum</i> Wall	I.	102	L		
<i>elodeoides</i> Choisy	I.	101	<i>Lannea</i> A. Rich	II.	338
<i>Hookerianum</i>			<i>grandis</i> A. Rich.	II.	338
<i>W. & A.</i>	I.	100	<i>Leea</i> Linn.	II.	303
<i>japonicum</i> Thunb	I.	102	<i>acuminata</i> Wall.	II.	304
<i>Lalandii</i> Choisy	I.	102	<i>æquata</i> Linn.	II.	307
<i>monanthemum</i>			<i>alata</i> Edgew.	II.	303
<i>Hk. f. & T.</i>	I.	102	<i>aspera</i> Edgew.	II.	306
<i>oblongifolium</i> Hk. f.	I.	100	<i>bracteata</i>		
<i>patulum</i> Thunb.	I.	101	<i>C. B. Clarke,</i>	II.	308
<i>Sampsonii</i> Hance	I.	102	<i>crispa</i> Willd.	II.	305
			<i>macrophylla</i> Roxb.	II.	305
I			<i>robusta</i> Roxb.	II.	308
ICACINACEÆ	II.	250	<i>sambucina</i> Willd.	II.	307
<i>Ilex</i> Linn.	II.	255	<i>sp.</i>	II.	304
<i>Doniana</i> DC.	II.	257	<i>trifoliata</i> Laws.	II.	305
<i>embelioides</i> Hk. f.			<i>umbraculifera</i>		
<i>p. et. Thom.</i>	II.	258	<i>C. B. Clarke.</i>	II.	306, 307 & 308

	Part	Page		Part	Page
Wightii			Mangifera Linn.	II.	335
<i>C. B. Clarke.</i>	II.	304	andamanica King.	II.	336
Lepidium Linn.	I.	71	indica Linn.	II.	335
sativum Linn.	I.	71	sylvatica Roxb.	II.	336
Lepionurus Bl.	II.	250	Manglietia Bl.	I.	15
oblongifolius Mast.	II.	250	Caveana		
sylvestris Bl.	II.	250	<i>Hk. f. & Th.</i>	I.	16
Lepisanthes Bl.	II.	319	Hookeri Cubitt and		
assamica Radlk.	II.	319	<i>Smith Rec.</i>	I.	16
burmanica Kurz.	II.	319	insignis Bl.	I.	16
Listeri King.	II.	319	latifolia	I.	16
Limacia Lour.	I.	56	Mappia Jacq.	II.	252
cuspidata			fetida Miers.	II.	252
<i>Hk. f. & Th.</i>	I.	56	Melia Linn.	II.	227
LINACEÆ	II.	185	Azadirachta Linn.	II.	227
Lophopetalum			Azedarach Linn.	II.	228
Wight.	II.	266	birmanica Kurz.	II.	229
fimbriatum Wight.	II.	266	composita Willd.	II.	228
Lophophyllum Griff.	I.	53	dubia F. B. I.	II.	228
bieristatum Griff.	I.	53	indica Brandis.	II.	227
Luvunga Hamilt.	II.	209	superba Roxb.	II.	229
scandens Ham.	II.	209	Toosandan Siebet.	II.	228
			MELIACEÆ	II.	226
			Meliosma Bl.	II.	327
M			Arnottiana Wight.	II.	329
Magnolia Linn.	I.	12	Mannii Lace.	II.	327
globosa			pinnata Roxb.	II.	329
<i>Hk. f. & Th.</i>	I.	29	simplicifolia Roxb.	II.	327
Griffithii			Wallichii Planch.	II.	328
<i>Hk. f. & Th.</i>	I.	14	Melodorum Dunal.	I.	47
Gustavi King.	I.	15	bicolor		
Pealiana King.	I.	14	<i>Hk. f. & Th.</i>	I.	47
pterocarpa Roxb.	I.	13	polyanthum		
sphenocarpa Roxb.	I.	14	<i>Hk. f. & Th.</i>	I.	49
MAGNOLIACEÆ	I.	12	rubiginosum		
Mahonia Nutt.	I.	61	<i>Hk. f. & Th.</i>	I.	48
acanthifolia Takeda.	I.	62	rufinerve		
manipurensis			<i>Hk. f. & Th.</i>	I.	49
Takeda.	I.	62	verrucosum		
nepalensis DC.	I.	61&62	<i>Hk. f. & Th.</i>	I.	47
pyncophylla Takeda.	I.	62	Wallichii		
Simonsii Takeda	I.	62	<i>Hk. f. & Th.</i>	I.	48
MALPIGHIACEÆ	I.	187	MENISPERMACEÆ	I.	50
MALVACEÆ	I.	139	Mesua Linn.	I.	111
Malvastrum coromande-			ferrea Linn.	I.	111
lianum Gracke.	I.	141	Michelia Linn.	I.	20
tricuspidatum			Cathcartii		
A. Gray.	I.	141	<i>Hk. f. & Th.</i>	I.	21
			Champaca Linn.	I.	22

Part	Page	Part	Page
doltsopa		Nsturtium Br.	I. 70
<i>Buch-Ham</i>	I. 26	baenghalense DC.	I. 70
excelsa Bl.	I. 21	indicum DC.	I. 70
excelsa Wall.	I. 26	officinale Br.	I. 70
Kingii Dandy.	I. 26	Natsiatum Ham.	II. 253
Kisopa DC.	I. 23	herpelicum Ham.	II. 253
lanuginosa Wall.	I. 22	Nelumbium Tuss.	I. 65
manipurensis Wall.	I. 25	speciosum Willd.	I. 65
Mannii King.	I. 25	Nephelium Linn.	II. 323
montana Bl.	I. 25	Lit-chi Camb.	II. 323
oblonga Wall.	I. 24	Longana Camb.	II. 223
punduana		Nymphæa Linn.	I. 64
<i>Hk. f. & Th.</i>	I. 23	Lotus Linn.	I. 64
Wardii Dandy.	I. 26	pygmæa Aiton.	I. 64
Micromelum Bl.	II. 208	rubra	I. 64
pubescens Bl.	II. 208	stellata Willd.	I. 66
Microtropis Wall.	II. 267	NYMPHÆACEÆ	I. 63
discolor Wall.	II. 267		
Miliusa Lesch.	I. 40		
macrocarpa			
<i>Hk. f. & Th.</i>	I. 41	O	
Roxburghiana		Ochna Linn.	II. 219
<i>Hk. f. & Th.</i>	I. 41	pumila Ham.	II. 220
velutina		squarrosa Linn.	II. 220
<i>Hk. f. & Th.</i>	I. 41	Wallichii Planch.	II. 219
Miquelia Meissn.	II. 253	OCHNACEÆ	II. 219
kleinii Meissn	II. 253	Ochrocarpus	
Mischocarpus		<i>Thouars.</i>	I. 110
pentapetalus		longifolius	
<i>Rudlk.</i>	II. 317	<i>Benth & Hook. f.</i>	I. 111
Mitrephora Bl.	I. 38	siamensis	
tomentosa		<i>T. Anderes.</i>	I. 111
<i>Hk. f. & Th.</i>	I. 38	Ocina Roxb.	II. 338
MORINGACEÆ	II. 342	Wodier Roxb.	II. 338
Morninga Lamk.	II. 342	OLACACEÆ	II. 246
pterygosperma		Olaç Linn.	II. 246
<i>Gærtn.</i>	II. 342	acuminata Wall.	II. 247
Munronia Wight.	II. 234	nana Wall.	II. 247
Wallichii Wight.	II. 234	OXALIDACEÆ	II. 191
Murraya Linn.	II. 207	Oxymitra Bl.	I. 46
exotica Linn.	II. 207	fornicata	
Kœnigii Speng.	II. 208	<i>Hk. F. & Th.</i>	I. 46
N		P	
Nandina Thunb.	I. 63	Pachylarnax Dandy.	I. 19
domestica Thunb.	I. 63	pleiocarpa	
Naravelia DC.	I. 6	<i>Dandy sp. Nov.</i>	I. 19
zeylanica DC.	I. 6	PAPAVERACEÆ	I. 65

	Part	Page		Part	Page
<i>Papaver somniferum</i>			<i>Hookeri King.</i>	I.	36
<i>Linn.</i>	I.	66	<i>Kurzii King.</i>	I.	36
<i>Parabiena Miers.</i>	I.	58	<i>Pterospermum Schreb.</i>	I.	156
<i>sagittata Miers.</i>	I.	58	<i>acerifolium Willd.</i>	I.	157
<i>Paramignya Wight.</i>	II.	210	<i>Blumeanus Korth.</i>	I.	159
<i>citrifolia Hk. f.</i>	II.	211	<i>lanceaefolium Roxb.</i>	I.	158
<i>Griffithii Hk. f.</i>	II.	211	<i>Pulsatilla</i>	I.	9
<i>monophylla</i>			<i>Pycnarrhena Miers.</i>	I.	58
<i>Wight.</i>	II.	212	<i>pleniflora Miers.</i>	I.	58
<i>Paravatia Brunoniana</i>			<i>Pyrenaria Bl.</i>	I.	118
<i>Decaisne.</i>	I.	60	<i>barringtoniaefolia</i>		
<i>Parthenocissus semi-</i>			<i>Seem.</i>	I.	118
<i>cordata Planch.</i>	II.	296	<i>diospyricarpa Kurz.</i>	I.	119
<i>Pericampylus Miers.</i>	I.	52			
<i>incanus Miers.</i>	I.	52&53			
<i>Picrasma Bl.</i>	II.	217			
<i>javanica Bl.</i>	II.	217			
<i>nepalensis Benn.</i>	II.	218			
<i>quassioides</i>					
<i>Bennet.</i>	II.	217			
PITTOSPORACEÆ	I.	94			
<i>Pittosporum Banks.</i>	I.	94			
<i>floribundum</i>					
<i>W. & A.</i>	I.	95			
<i>glabratum Lindl.</i>	I.	95			
<i>humile Hk. f. & Th.</i>	I.	96			
<i>Plagiopteron Griff.</i>	I.	169			
<i>suaveolens Griff.</i>	I.	169			
<i>Polyalthia Bl.</i>	I.	31			
<i>argentea</i>					
<i>Hk. f. & Th.</i>	I.	36			
<i>cerasoides</i>					
<i>Benth. & Hk. f.</i>	I.	32			
<i>Jenkinsii</i>					
<i>Benth. & Hk. f.</i>	I.	32			
<i>longifolia</i>					
<i>Benth. & Hk. f.</i>	I.	31			
<i>simiarum</i>					
<i>Benth. & Hk. f.</i>	I.	31			
<i>suberosa</i>					
<i>Benth. & Hk. f.</i>	I.	23			
<i>Polygala Linn.</i>	I.	97			
<i>arillata Hamilt.</i>	I.	97			
<i>crocalarioides Ham.</i>	I.	97			
<i>glomerata Lour.</i>	I.	98			
<i>leptalea DC.</i>	I.	98			
<i>sibirica Linn.</i>	I.	98			
POLYGALACEÆ	I.	97			
<i>Popowia Endl.</i>	I.	36			

R

RANUNCULACEÆ	I.	1
<i>Ranunculus Linn.</i>	I.	8
<i>diffusus DC.</i>	I.	9
<i>pensylvanicus Linn.</i>	I.	9
<i>scleratus Linn.</i>	I.	8
<i>Raphanus Linn.</i>	I.	71
<i>sativus Linn.</i>	I.	71
<i>Reevesia Lindl.</i>	I.	159
<i>Wallichii Brown.</i>	I.	159
<i>Reinwardtia</i>		
<i>Dumort.</i>	II.	185
<i>tetragyna Planch.</i>	II.	158&186
<i>trigyna Planch.</i>	II.	185
RHAMNACEÆ	II.	276
<i>Rhamnus Linn.</i>	II.	285
<i>dahuricus F.B.I.</i>	II.	285
<i>nepalensis Wall.</i>	II.	285
<i>virgatus Roxb.</i>	II.	285
<i>Rhus Linn.</i>	II.	330
<i>Griffithii Hk. f.</i>	II.	332
<i>insignis Hk. f.</i>	II.	332
<i>Khasiana Hk. f.</i>	II.	331
<i>semialata Murr.</i>	II.	331
<i>succedanea Linn.</i>	II.	332
<i>Roydsia Roxb.</i>	I.	79
<i>suaveolens Roxb.</i>	I.	79
RUTACEÆ	II.	192

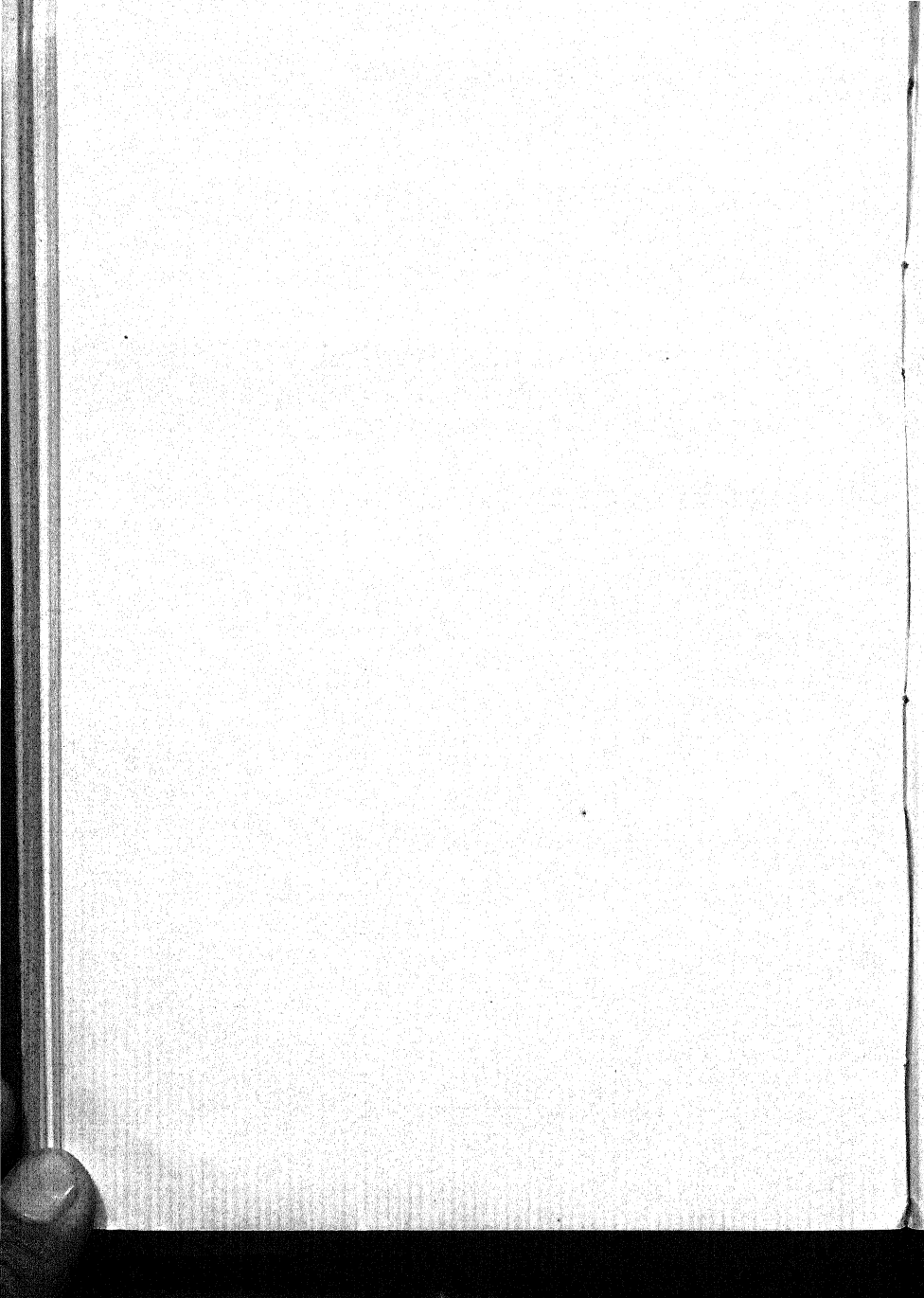
S

<i>Sabia Coleb.</i>	II.	324
<i>lanceolata Colebr.</i>	II.	325
<i>limoniacea Wall.</i>	II.	326

	Part	Page		Part	Page
paniculata <i>Edgew.</i>	II.	326	tavoyana <i>Wall.</i>	I.	98
parviflora <i>Wall.</i>	II.	325	Semecarpus <i>Linn. f.</i>	II.	333
purpurea			Anacardium		
<i>lk. f. & Th.</i>	II.	325	<i>Linn. f.</i>	II.	333
<i>sp.</i>	II.	326	heterophyllus <i>Hkf.</i>	II.	334
SABIACEÆ	II.	324	Prainii <i>King.</i>	II.	334
Sageræa <i>Dalx.</i>	I.	42	Shorea <i>Roxb.</i>	I.	135
<i>laurina Dalx.</i>	I.	42	<i>assamica Dyer.</i>	I.	135
Sageretia <i>Brongn.</i>	II.	284	<i>robusta Gaertn.</i>	I.	135
<i>hamosa Brongn.</i>	II.	284	Sida <i>Linn.</i>	I.	140
<i>oppositifolia Brongn.</i>	II.	284	<i>carpinifolia Linn.</i>	I.	140
Salacia <i>Linn.</i>	II.	274	<i>cordifolia Linn.</i>	I.	140
<i>floribunda Wight.</i>	II.	275	<i>rhombifolia Linn.</i>	I.	140
<i>membranacea Laws.</i>	II.	275	<i>rhomboidea Rob.</i>	I.	140
<i>prinoides DC.</i>	II.	274	SIMARUBACEÆ	II.	216
Roxburghii <i>Wall.</i>	II.	275	Skimmia <i>Thunb.</i>	II.	204
SAPINDACEÆ	II.	312	<i>laureola Hk. f.</i>	II.	204
Sapindus <i>Plum.</i>	II.	320	Sloanea <i>Linn.</i>	I.	182
<i>attenatus Wall.</i>	II.	321	Smythea <i>Seem.</i>	II.	278
<i>Danura Voigt.</i>	II.	322	<i>calpicarpa Kurx.</i>	II.	279
<i>Mukorossi Gaertn.</i>	II.	316&320	Spondias <i>Linn.</i>	II.	340
Saurauja <i>Willd.</i>	I.	126	<i>axillaris Roxb.</i>	II.	341
<i>cerea Griff.</i>	I.	130	<i>mangifera Willd.</i>	II.	340
<i>fasciculata Wall.</i>	I.	129	STAPHYLEACEÆ	II.	309
<i>Griffithii Dyer.</i>	I.	127	Stauntonia <i>DC.</i>	I.	59
<i>macrotricha Kurx.</i>	I.	129	<i>Brunoniana Wall.</i>	I.	60
<i>napaulensis DC.</i>	I.	127	<i>elliptica Hemal.</i>	I.	60
<i>punduana Wall.</i>	I.	129	<i>filamentosa Griffith.</i>	I.	60
<i>Roxburghii Wall.</i>	I.	128	Stephania <i>Lour.</i>	I.	51
Schima <i>Reinw.</i>	I.	119	<i>elegans Hk. f. & Th.</i>	I.	51
<i>khasiana Dyer.</i>	I.	120	<i>glandulifera Miers.</i>	I.	52
<i>Wallichii Choisy.</i>	I.	119	<i>hernandifolia Walp.</i>	I.	51
Schizandra <i>Michaux.</i>	I.	27	<i>rotunda Lour.</i>	I.	52
<i>axillaris Hk. f. & Th.</i>	I.	29	Sterculia <i>Linn.</i>	I.	149
<i>elongata Hk. f. & Th.</i>	I.	27	<i>alata Roxb.</i>	I.	153
<i>propinqua Hk. f. & Th.</i>	I.	28	<i>coccinea Roxb.</i>	I.	153
<i>sphenanthera Rehd & Wils.</i>	I.	28	<i>colorata Roxb.</i>	I.	151
Schleichera <i>Willd.</i>	II.	320	<i>guttata Roxb.</i>	I.	152
<i>trijuga Willd.</i>	II.	320	<i>khasiana King mss.</i>	I.	154
Schœpfia <i>Schreb.</i>	II.	249	<i>Roxburghii Wall.</i>	I.	153
<i>acuminata Wall.</i>	II.	249	<i>sp.</i>	I.	154
<i>fragans Wall.</i>	II.	249	<i>versicolor Wall.</i>	I.	150
Securidaca <i>Linn.</i>	II.	98	<i>villosa Roxb.</i>	I.	151
			STERCULIACEÆ	I.	149

	Part	Page		Part	Page
T					
Talauma Juss.	I.	17	Mastersii Diels.	I.	55
Hodgsoni			Toddalia Juss.	II.	203
Hk. f. & Th.	I.	14&17	aculeata Pers.	II.	203
phellocarpa King.	I.	18	asiatica Lamk.	II.	203
Rabadiana			Triumfetta Linn.	I.	167
Hk. f. & Th.	I.	18	cana Bl.	I.	168
TAMARICACEÆ	I.	99	pilosa Roth.	I.	167
Tamarix Linn.	I.	99	rhomboidea Jacq.	I.	168
dioica Roxb.	I.	99	tomentosa Bojrr.	I.	168
Tapiria Juss.	I.	339	Turpinia Vent.	II.	309
hirsuta Hk. f.	I.	339	pomifera DC.	II.	309
Taraktogenos			nepalensis Wall.	II.	310
kurzii King.	I.	87&88	U		
Ternstroemia Linn.	I.	116	Unona Linn.	I.	33
japonica Thumb.	I.	116	Desmos Dunal.	I.	35
TERNSTROEMIACEÆ	I.	115	discolor Vahl.	I.	35
Tetrastigma bracte-			dumosa Roxb.	I.	35
olatum Planch.	II.	296	longiflora Roxb.	I.	34
dubium Planch.	II.	299	præcox		
lanceolarium			Hk. f. & Th.	I.	34
Planch.	II.	300	Urena Linn.	I.	141
obovatum Gagnep	II.	298	lobata Linn.	I.	141
Parkeri Gagnep	II.	297	Uvaria Linn.	I.	44
serrulatum Planch.	II.	299	bracteata Roxb.	I.	45
Thomsonianum			Hamiltoni		
Planch.	II.	297	Hk. f. & Th.	I.	44
THALAMIFLORÆ	I.	1	Kurzii	I.	44
Thalictrum Linn.	I.	7	lurida Hk. f. & Th.	I.	45
foliolosum Bl.	I.	7	macrophylla Roxb.	I.	45
glandulosum	I.	7	V		
glaucum	I.	7	Vatica Linn.	I.	137
javanicum Bl.	I.	8	lanceifolia Bl.	I.	137
punduanum Wall.	I.	7	Shingkeng Dunn.	I.	138
Thea chinensis Linn.	I.	122	Ventilago Gertn.	II.	276
Thespsia			calyculata Tulanse.	II.	277
Soland ex Corr.	I.	145	madraspatana		
Lampas			Gertn.	II.	277
Dalx et. Gibs.	I.	145	Viola Linn.	I.	80
macrophylla Blume.	I.	145	arcuata Bl.	I.	81
TILIACEÆ	I.	161	diffusa Ging.	I.	81
Tinomisium			distans Wall.	I.	81
micranthum Diels			odorata Linn.	I.	82
in Pflanzenreich.	I.	59	patrinii DC.	I.	80
Tinospora Miers.	I.	54	serpens Wall.	I.	81
cordifolia Miers.	I.	54&56	tricolor Linn.	I.	81
crispa Miers	I.	54			
malabarica Miers.	I.	55			

	Part	Page		Part	Page
VIOLACEÆ	I.	80	<i>trifolia Linn.</i>	II.	295
<i>Vitis Linn.</i>	II.	287	<i>vinifera Linn.</i>	II.	293
<i>adnata Wall.</i>	II.	291			
<i>angustifolia Wall.</i>	II.	297	W		
<i>assamica Laws.</i>	II.	291	<i>Walsura Roxb.</i>	II.	240
<i>barbata Wall.</i>	II.	292	<i>robusta Roxb.</i>	II.	241
<i>bracteolata Wall.</i>	II.	296	<i>tubulata Hiern.</i>	II.	240
<i>campylocarpa</i>					
<i>Kurz.</i>	II.	297	X		
<i>capriolata Don.</i>	II.	299	<i>Xanthophyllum</i>		
<i>carnosa Wall.</i>	II.	295	<i>Roxb.</i>	I.	99
<i>discolor Dalz.</i>	II.	290	<i>flavescens Roxb.</i>	I.	99
<i>dispersa Hutch.</i>	II.	292	<i>virens Roxb.</i>	I.	99
<i>divaricata Wall.</i>	II.	294	<i>Xerospermum Bl.</i>	II.	322
<i>dubia Laws</i>	II.	299	<i>Noronhianum Bl.</i>	II.	322
<i>elongata Kurz.</i>	II.	297	<i>Xylosma Froster.</i>	I.	90
<i>glabra</i>	II.	293	<i>controversum</i>		
<i>heyneana Roem</i>			<i>Clos.</i>	I.	91
<i>et schult.</i>	II.	294	<i>longifolium Clos.</i>	II.	90
<i>himalayana</i>					
<i>Brandl</i>	II.	296	Z		
<i>Hookeri Laws.</i>	II.	301	<i>Zanthoxylum Linn.</i>	II.	196
<i>japonica Thunb.</i>	II.	301	<i>acanthopodium</i>		
<i>lanata Roxb.</i>	II.	293	<i>DC.</i>	II.	200
<i>lanceolata Roxb</i>	II.	300	<i>alatum Roxb.</i>	II.	199
<i>latifolia Roxb.</i>	II.	293	<i>Budrunga Wall.</i>	II.	198
<i>macrophylla</i>			<i>Hamiltonianum</i>		
<i>Madden.</i>	II.	294	<i>Wall.</i>	II.	201
<i>mollis Wall.</i>	II.	301	<i>khasianum Hk. f.</i>	II.	202
<i>nervosa Laws.</i>	II.	294	<i>myriacanthum</i>		
<i>neurosa Kurz.</i>	II.	298	<i>Wall.</i>	II.	199
<i>obovata Laws.</i>	II.	298	<i>ovalifolium</i>		
<i>oxyphylla Wall.</i>	II.	299	<i>Wight.</i>	II.	202
<i>pedata Vahl.</i>	II.	302	<i>oxyphyllum</i>		
<i>planicaulis Hk. f.</i>	II.	298	<i>Edgew.</i>	II.	201
<i>quadrangularis</i>			<i>Rhetsa DC.</i>	II.	197
<i>Wall.</i>	II.	290	<i>Zizyphus Juss.</i>	II.	278
<i>repanda W. & A.</i>	II.	292	<i>apetala Hk. f.</i>	II.	281
<i>repens W. & A.</i>	II.	290	<i>funiculosa Ham.</i>	II.	282
<i>rubifolia Wall.</i>	II.	302	<i>glabrescens</i>		
<i>rugosa Wall.</i>	II.	294	<i>Prair.</i>	II.	282
<i>rugosa Hk. f.</i>	II.	294	<i>incurva Roxb.</i>	II.	280
<i>rumicisperma</i>			<i>Jujuba Lamk.</i>	II.	279
<i>Laws.</i>	II.	301	<i>Genoplia Mill.</i>	II.	280
<i>semicordata Wall.</i>	II.	296	<i>rugosa Lamk.</i>	II.	281
<i>sikkimensis Laws.</i>	II.	294			
<i>tenuifolia W. & A.</i>	II.	300			



INDEX

OF

VERNACULAR, SANSKRIT AND ENGLISH NAMES.

(*Ass.* means Assamese ; *Beng.* Bengali ; *Cach.* Cachar or Cachari ; *Daff.* Daffla ; *Kach.* Kachari ; *Kñ.* Khasi ; *Lush.* Lushai ; *Manip.* Manipuri ; *Mik.* Mikir ; *Nep.* Nepali ; *Sans.* Sanskrit ; *Syl.* or *Sylñ.* Sylhet ; *Synt.* Synteng ; *Tipp.* Tippera.)

A			Part	Page		Part	Page
Abari-asing	<i>Miri</i>	&			Amora, <i>Ass.</i>	II.	340
<i>Abor.</i>		II.	228		Ampri-arong, <i>Mik.</i>	I.	107
Abbuk-asing, <i>Abor.</i>	I.		93		Amra, <i>Sans., Beng.</i>	II.	335
Abigran, <i>Garo</i>	II.		316		Amrataka, <i>Sans.</i>	II.	340
Adalia-poma, <i>Cach.</i>	II.		338		Amratenga, <i>Ass.</i>	II.	340
Aeo, <i>Naga</i>	II.		217		Amrenga, <i>Garo</i>	II.	192
Agatchi-badura,					Am-selenga, <i>Ass.</i>	II.	316 & 337
<i>Garo</i>	I.		11		Amsia, <i>Ass.</i>	II.	337
Agimmok, <i>Garo</i>	II.		341		Amung-gok, <i>Garo</i>	II.	341
Agong, <i>Garo</i>	I.		173		Ancham-chamkai,		
Agra, <i>Ass.</i>	I.	141 &	168		<i>Kuki</i>	II.	277
Agri, <i>Garo</i>	II.		221		Anor, <i>Beng. & Sylh.</i>	II.	280
Ahina, <i>Ass.</i>	II.		306		An-pang, <i>Kuki</i>	I.	147
Ain-kimbel, <i>Abor.</i>	II.		275		Anphang-thing,		
Aitang, <i>Tipp.</i>	I.		10		<i>Kuki</i>	I.	148
Aithlang-shrui, <i>Kuki</i>	I.		10		Antei, <i>Kuki</i>	II.	242
Aithlong, <i>Lush.</i>	I.		10		Antha-thing, <i>Kuki</i>	I.	169
Aitrang, <i>Kuki</i>	I.		10		Arbeng-thing, <i>Tipp.</i>	I.	128
Akertarug, <i>Daff.</i>	II.		281		Arhik-bouna, <i>Lush.</i>	II.	315
Akron-arong, <i>Mik.</i>	I.		93		Arhit-thi, <i>Kuki</i>	II.	206
Akshi, <i>Ass.</i>	I.		11		Arishta, <i>Sans.</i>	II.	320
Am, <i>Ass. & Beng.</i>	II.		335		Arkhar, <i>Lush. &</i>		
Amal-lata, <i>Beng.</i>	II.		295		<i>Kuki</i>	I.	155 & 158
Amari,					Arlak-arong, <i>Mik.</i>	I.	146
<i>Ass.</i>	II.	231, 236 &			Arlak-pi, <i>Mik.</i>	I.	169
		237			Arlakso-arong, <i>Mik.</i>	I.	146
Ambi-thong, <i>Garo</i>	II.		340		Arnatto, <i>Eng.</i>	I.	83
Ambri-thong, <i>Garo</i>	II.		340		Aruak, <i>Garo</i>	I.	104
Ambruj, <i>Beng.</i>	II.		322		Arushka, <i>Sans.</i>	II.	333
Aming-gok, <i>Garo</i>	II.	228 &	341		Asaria, <i>Beng.</i>	I.	77
Amkhi-si-phak, <i>Garo</i>	I.		178		Asari-baphang, <i>Kach.</i>	I.	93
Amor, <i>Ass.</i>	II.		340		Asra-jola, <i>Mech.</i>	II.	304 & 306

	Part	Page		Part	Page
Asri-phang, <i>Kach.</i>	II.	323	Bandor-kakoi		
As-sera, <i>Beng.</i>	II.	205	(Monkey's comb),		
Asuri-baphang,			<i>Ass.</i>	I.	182
<i>Kach.</i>	II.	323	Bandre, <i>Nep.</i>	I.	87
Ata, <i>Beng.</i>	I.	43	Banji-asing, <i>Miri</i>	II.	242
Ata-kothal, <i>Ass.</i>	I.	43	Banji-ou, <i>Ass.</i>	I.	11
Atari-lata, <i>Beng.</i>	&		Bankamla, <i>Manip.</i>	II.	210
<i>Cach.</i>	II.	273	Bankung-asing,		
Athaiba, <i>Mech.</i>	I.	87	<i>Miri</i>	II.	222
Atibala, <i>Sans.</i>	I.	140	Banpasola, <i>Ass.</i>	II.	329
Avor, <i>Tipp.</i>	I.	157	Bansula, <i>Beng.</i>	I.	68
Ayr-soh-um, <i>Kh.</i>	I.	70	Bantan, <i>Kuki</i>	I.	153
B			Baral-panrhe, <i>Nep.</i>	I.	52
Babari, <i>Garó</i>	II. 333 & 337		Baral-prati, <i>Nep.</i>	I.	52
Babari-chi, <i>Garó</i>	II.	328	Baramphthuri-sopa,		
Badari, <i>Sans.</i>	II.	279	<i>Ass.</i>	I.	13
Badar-phang, <i>Kach.</i>	I.	173	Bar-bhola, <i>Ass.</i>	II.	333
Bael tree, <i>Eng.</i>	II.	215	Barbi-asing, <i>Miri</i>	I.	165
Bagh-anchora, <i>Ass.</i>	II.	201	Bareri, <i>Garó</i>	II.	333
Bagh-chhala, <i>Jharua</i> &			Bar-gahori-sopa,		
<i>Mech.</i>	I.	141	<i>Ass.</i>	I.	14
Bagnai, <i>Beng.</i>	I.	77	Barla-arong, <i>Mik.</i>	II.	333
Bagu-rata, <i>Kuki</i> &			Barun, <i>Ass. & Beng.</i>	I. 73 & 74	
<i>Kach.</i>	II.	236	Basanti, <i>Beng.</i>	II.	188
Baidarj, <i>Sylh.</i>	II.	236	Bata-bakuri-arong,		
Baiza, <i>Lush.</i>	I.	142	<i>Mik.</i>	II.	281
Bajar-mali, <i>Ass.</i>	II.	197	Batavi-nebu, <i>Beng.</i>	II.	215
Bajar-mani, <i>Ass.</i>	II.	197	Bat-soh-plia, <i>Kh.</i>	I.	7
Bajar-muni, <i>Ass.</i>	II.	198	Batyalaka, <i>Sans.</i>	I.	140
Bajiou, <i>Ass.</i>	II.	304	Bau-changne, <i>Daff.</i>	I.	10
Bajna, <i>Ass.</i>	II.	198	Bau-taruk, <i>Daff.</i>	I.	10
Bajrang, <i>Cach.</i> &			Bazarnali, <i>Ass.</i>	II.	198
<i>Sylh.</i>	II.	198	Behalisham, <i>Garó</i>	I.	6
Bakol-khowa-tenga,			Behari, <i>Ass.</i>	I.	69
<i>Ass.</i>	II.	213	Bel, <i>Beng. & Ass.</i>	II.	215
Bala, <i>Beng & Sans.</i>	I.	140	Belam-asing, <i>Abor</i> &		
Bala-phomijioika,			<i>Miri.</i>	II.	341
<i>Sans.</i>	I.	140	Belam-changne,		
Balibu, <i>Garó</i>	I.	87	<i>Daff.</i>	II.	341
Ban-barai, <i>Sylh.</i>	I.	158	Belethi, <i>Garó</i>	II.	215
Ban-chalta, <i>Beng.</i>	II.	305	Belphoi, <i>Sylh.</i>	I.	173
Bandardima, <i>Ass.</i>	II.	232	Bengjari, <i>Ass.</i>	II.	206
Bandarpela, <i>Cach.</i>	I.	153	Bepui-rhui, <i>Lush.</i>	II.	297
Bandarpele, <i>Ass.</i>	I.	87	Berela, <i>Ass.</i> &		
Band-kobi, <i>Beng.</i> &			<i>Beng.</i>	I.	140
<i>Hind.</i>	I.	69	Beri-rata, <i>Sylh.</i>	II. 225 & 236	
Bandordima, <i>Ass.</i>	II. 233 & 234		Beroh, <i>Lush.</i> &		
			<i>Kuki</i>	II.	225
			Bero-rata, <i>Tipp.</i>	II.	225

	Part	Page		Part	Page
Bero-thing, <i>Kuki</i>	II.	224	Bolang-banchibok,		
Bewa-chhamphe,			<i>Garó</i>	I.	31
<i>Garó</i>	I.	24	Bol-asin, <i>Garó</i>	II.	231
Bhadraik, <i>Ass.</i>	I.	180	Bol-bret, <i>Garó</i>	II.	243
Bhadraksha, <i>Ass.</i>	I.	180	Bol-chhachhat,		
Bhagni, <i>Ass.</i>	I.	93	<i>Garó</i>	II.	231
Bhaknimlo, <i>Nep.</i>	II.	331	Bolchhu, <i>Garó</i>	I.	147
Bhala, <i>Beng.</i>	II.	333	Bolchibins, <i>Garó</i>	I.	162
Bhallataka, <i>Sans.</i>	II.	333	Bolchigamba, <i>Garó</i>	II.	338
Bhalo, <i>Mech.</i>	II.	333	Bol-dikim, <i>Garó</i>	II.	309
Bhalukdat, <i>Ass.</i>	II.	208	Bol-dorek, <i>Garó</i>	II.	241
Bhaola, <i>Mech.</i>	II.	333	Boldreng, <i>Garó</i>	I.	92
Bhatia-lot, <i>Sylh.</i>	II.	291	Boldubak, <i>Garó</i>	I.	146
Bhatiya-lot, <i>Sylh.</i>	II.	292	Boldublok, <i>Garó</i>	II.	241
Bhaura, <i>Ass.</i>	II.	208	Bolduiagreng, <i>Garó</i>	I.	93
Bhela, <i>Beng.</i>	II.	333	Boldu-jag-reng,		
Bhelawa, <i>Mech.</i>	II.	333	<i>Garó</i>	I.	86
Bhendi, <i>Ass.</i>	I.	144	Boldujagreng, <i>Garó</i>	I. 92 &	94
Bhind, <i>Beng.</i>	I.	144	Bolgrak, <i>Garó</i>	II.	203
Bhindi, <i>Hind.</i>	I.	144	Bol-jakru-chhen,		
Bhot-boguri, <i>Jharua</i>	II.	281	<i>Garó</i>	I.	32
Bnot-odla, <i>Mech.</i>	II.	157	Bol-khat-thi, <i>Garó</i>	II.	332
Bhoto-mayna,			Bol-khrenthi, <i>Garó</i>	II.	241
<i>Jharua</i>	II. 236 &	237	Bol-mengu, <i>Garó</i>	I.	164
Bhumlati, <i>Ass.</i>	II.	269	Bol-micheng, <i>Garó</i>	II. 197 &	332
Bijol-goch, <i>Ass.</i>	I.	163	Bolmichik, <i>Garó</i>	II.	329
Bikha-kulia, <i>Ass.</i>	II.	256	Bol-mikachhak,		
Bil, <i>Lush.</i>	II.	223	<i>Garó</i>	II.	256
Bilwa, <i>Sans.</i>	II.	215	Bol-mring, <i>Garó</i>	I.	18
Bipo-bum-the-arong,			Bol-nabat, <i>Garó</i>	I. 22 &	158
<i>Mik.</i>	I.	166	Bol-narang, <i>Garó</i>	II. 232 &	247
Biringa, <i>Ass.</i>	II.	285	Bolnghas, <i>Nep.</i>	I.	168
Biring-guli, <i>Ass.</i>	II.	285	Bolong, <i>Garó, Ass.</i>	I. 40, 86 &	113
Bishahari, <i>Ass.</i>	II.	208	Bolong-maindok,		
Blachung-changne,			<i>Garó</i>	I.	92
<i>Daff.</i>	I.	105	Bolong-maindop,		
Boga-amari, <i>Ass.</i>	II.	236	<i>Garó</i>	I.	92
Boga-banderdima,			Bolong-maindot,		
<i>Ass.</i>	II.	232	<i>Garó</i>	I.	92
Boga-khomtou, <i>Ass.</i>	I.	31	Bolong-wah-vthri,		
Boga-poma, <i>Ass.</i>	II.	241	<i>Garó</i>	I.	86
Boguri, <i>Ass.</i>	II.	279	Bol-phukrum, <i>Garó</i>	II.	286
Bohog-odla, <i>Mech.</i>	I.	151	Bol-ragong, <i>Garó</i>	I.	173
Bokain, <i>Hind.</i>	II.	228	Bol-rimmu, <i>Garó</i>	II.	314
Bokta, <i>Garó</i>	I.	158	Bolsal, <i>Garó</i>	I.	135
Bol-agal, <i>Garó</i>	II.	333	Bol-samphal, <i>Garó</i>	II.	236
Bol-agru, <i>Garó</i>	II.	338	Bol-thajong, <i>Garó</i>	II.	256
Bol-ai, <i>Garó</i>	II.	257	Bol-thekachu, <i>Garó</i>	II.	337
Bol-ajun, <i>Garó</i>	I.	151	Bol-thimatchi, <i>Garó</i>	II.	203
Bolandime, <i>Garó</i>	II.	329			

	Part	Page		Part	Page
Bombal, <i>Lush.</i>	II.	337	Bon-ponial, <i>Ass.</i>	I.	42
Bombathing, <i>Kuki</i>	I.	108	Bon-poshla, <i>Ass.</i>	I.	217
Bombs, <i>Tipp.</i>	II.	221	Bon-posola, <i>Ass.</i>	I.	128
Bombus, <i>Tipp.</i>	II.	221	Bon-ridim-phang,		
Bom-pel-thing,			<i>Kach.</i>	II.	241
<i>Kuki</i>	II.	273	Bon-ou, <i>Ass.</i>	II.	306
Bonak, <i>Cach.</i>	I.	119	Bonsha, <i>Ass.</i>	I.	87
Bon-am, <i>Ass.</i>	II.	336	Bon-sobai, <i>Mech.</i>	I.	125
Bon-baguri, <i>Ass.</i>	I.	158	Bonsu-buphang,		
Bon-boguri, <i>Ass.</i>	II. 281 &	282	<i>Kach.</i>	II.	337
Bon-boroi, <i>Sylh.</i>	II.	281	Bonthai-phang,		
Bon-champa, <i>Cach.</i>	I.	177	<i>Kach.</i>	II. 221 &	222
Boncholta, <i>Cach.</i>	I.	11	Bon-tituli, <i>Ass.</i>	I.	158
Bon-dau-iung, <i>Cach.</i>	II.	232	Bora-asing, <i>Miri</i>	II. 195 &	196
Bondonthuphang,			Boragi-asing, <i>Miri</i>	I.	172
<i>Kach.</i>	I.	155	Bor-amari, <i>Ass.</i>	II.	236
Bondousa, <i>Mech.</i>	I.	125	Bor-chopa, <i>Ass.</i>	I.	178
Bon-dusa-phang,			Boriala, <i>Ass.</i>	I.	140
<i>Cach.</i>	I.	166	Bor-jagreng, <i>Garó</i>	II.	217
Bon-gadhi, <i>Ass.</i>	II.	321	Bor-jir-sinning,		
Bong-der-so-arong,			<i>Garó</i>	I.	128
<i>Mik.</i>	I. 163 &	164	Bor-kalia, <i>Ass.</i>	II.	277
Bong-lephuphang,			Bor-kemla, <i>Nep.</i>	I.	92
<i>Cach.</i>	II.	237	Borkeseru, <i>Ass.</i>	I.	216
Bong-long-thing,			Borkhentri, <i>Garó</i>	I.	163
<i>Mik.</i>	I.	153	Bor-kolióri, <i>Ass.</i>	I.	31
Bonhukha, <i>Kach.</i>	I.	74	Born-bokul, <i>Ass.</i>	II.	256
Bon-jalukia, <i>Ass.</i>	I.	2	Boroi, <i>Beng., Cach. &</i>		
Bon-jhalukia, <i>Ass.</i>	I.	93	<i>Sylh.</i>	II.	279
Bon-jamir, <i>Sylh.</i>	&		Boromthuri, <i>Ass.</i>	I.	17
<i>Ass.</i>	II. 205 &	208	Boron-thari-arong,		
Bonjora, <i>Ass.</i>	II.	211	<i>Mik.</i>	I.	17
Bonjuphang, <i>Kach.</i>	I.	147	Boronthuri, <i>Ass.</i>	I.	17
Bonkeseru, <i>Ass.</i>	II.	309	Borpat, <i>Ass.</i>	II.	216
Bon-kho-klu, <i>Cach.</i>	II.	328	Borsal, <i>Garó</i>	I.	135
Bon-khong-khrai-phang,			Bor-samphol, <i>Garó</i>	I. 41 & II.	224
<i>Kach.</i>	I.	173	Borsar, <i>Garó</i>	I.	135
Bon-kopah, <i>Ass.</i>	I.	146	Borsiring, <i>Garó</i>	II.	328
Bon-kopahi, <i>Ass.</i>	I. 146 &	156	Borsopa, <i>Ass.</i>	I.	24
Bon-kung-asing,			Borsthi, <i>Garó</i>	I.	31
<i>Miri</i>	II.	221	borsubret, <i>Garó</i>	I.	162
Bon-lai-su-phang,			Bor-thekera, <i>Ass.</i>	I.	107
<i>Kach.</i>	I.	178	Borun, <i>Ass. & Beng.</i>	I.	74
Bon-loisu-phang,			Borun-khosai, <i>Kach.</i>	I.	77
<i>Kach.</i>	I.	128	Borun-phita-phang,		
Bon-madhuri, <i>Ass.</i>	I.	118	<i>Kach.</i>	I.	77
Bon-marich, <i>Ass.</i>	I.	2	Bot-sasat, <i>Garó</i>	II.	225
Bon-maria, <i>Ass.</i>	I.	157	Bra-ragang-phang,		
Bon-misri, <i>Kach.</i>	II.	222	<i>Kach.</i>	I.	169
Bon-nahor, <i>Ass.</i>	I.	158			

	Part	Page		Part	Page
Bura, <i>Beng.</i>	&		Chengsu, <i>Garo</i>	I.	151
<i>Cach.</i>	II.	322	Chepeta-lot, <i>Ass.</i>	II.	295
Burbang-asing,			Chepeta-lota, <i>Ass.</i>	II.	298
<i>Abor.</i>	I.	17	Chepu-changne,		
Buru-buphang,			<i>Daff.</i>	I.	128
<i>Kach.</i>	I.	322	Chetia-bola, <i>Ass.</i>	II.	282
Buz-ruli, <i>Mech.</i>	II.	198	Chhagal-lati, <i>Beng.</i>	I.	6
C			Chhagladoi, <i>Ass.</i>	I.	93
Cha, <i>Hind. & Ass.</i>	I.	122	Chhagladuri, <i>Ass.</i>	I.	93
Chabailai-daugurung-			Chhag-loti, <i>Ass.</i>	I.	42
gedeba, <i>Kach.</i>	I.	58	Chhamisi, <i>Garo</i>	I.	124
Chachat, <i>Garo</i>	II.	231	Chham-nangal,		
Chag-ladoi, <i>Ass.</i>	I.	42	<i>Garo</i>	I.	177
Chagol-ladi, <i>Ass.</i>	II.	205	Chhikramarg, <i>Ass.</i>	I.	93
Chah, <i>Hind. & Ass.</i>	I.	122	Chi-cehirum, <i>Ass.</i>	II.	315
Chakle, <i>Jharua</i>	I.	146	Chidampha, <i>Garo</i>	II.	221
Chalita, <i>Beng.</i>	I.	10	Chigambol, <i>Garo</i>	II.	221
Chalta, <i>Beng.</i>	I.	10	Chikong-arong,		
Chamar-baphang,			<i>Mik.</i>	I.	151
<i>Cach.</i>	I.	214	Chiming-arong,		
Chambi-sersang,			<i>Mik.</i>	II.	340
<i>Garo</i>	I.	24	Chinese shoe flower,		
Cnamia, <i>Sylh.</i>	&		<i>Eng.</i>	I.	145
<i>Cach.</i>	I.	142	Chingan-arong,		
Champa, <i>Cach., Beng.,</i>			<i>Mik.</i>	I.	119
<i>Hind.</i>	I.	18 & 22	Chingchoi-arong,		
Champari-phang,			<i>Mik.</i>	II.	205
<i>Kach.</i>	I.	22	Chingir-phang,		
Changre, <i>Naga</i>	II.	201	<i>Cach.</i>	II.	198
Chany-hedim, <i>Mik.</i>	II.	241	Ching-kamla,		
Chapite-jamja, <i>Tipp. &</i>			<i>Manip.</i>	II.	210
<i>Kuki</i>	I.	13	Ching-kappa, <i>Naga</i>	I.	22
Charai-guti-khowa,			Ching-nai, <i>Naga</i>	I.	158
<i>Ass.</i>	I.	176	Ching-pha, <i>Tipp.</i>	I.	157
Charai-thengia, <i>Ass. &</i>			Ching-ren, <i>Naga</i>	I.	155
<i>Mik.</i>	II.	304	Chinjai-mailo-phang,		
Charchare-lata,			<i>Kach.</i>	II.	207
<i>Nep.</i>	II.	298	Chipung-changne,		
Charphal, <i>Manip.</i>	I.	173	<i>Daff.</i>	I.	128
Chaul-dhowa, <i>Ass.</i>	II.	205	Chirimpi, <i>Mik.</i>	I.	11
Chaulmugra, <i>Beng. &</i>			Chirimso, <i>Mik.</i>	I.	11
<i>Ass.</i>	I.	87	Chobsi, <i>Nep.</i>	I.	23
Cheknan, <i>Mik.</i>	II.	256	Chokori-poma, <i>Ass.</i>	II.	241
Cneknan-arong,			Chop-chopa, <i>Ass.</i>	I.	105
<i>Mik.</i>	I.	119	Choplipli, <i>Mik.</i>	II.	306
Chekong, <i>Mik.</i>	I.	151	Chota-dingari,		
Cheng-bichhal,			<i>Mech.</i>	II.	234
<i>Sylh.</i>	I.	181	Chuchi-am, <i>Nep.</i>	II.	336
			Chuma, <i>Garo</i>	II.	241
			Chumpa, <i>Abor.</i>	II.	10

	Part	Page		Part	Page
Chutti-lara, <i>Nep.</i>	II.	338	Dhumboil, <i>Cach.</i>	I.	148
Cress (common), <i>Eng.</i>	I.	71	Dhuna, <i>Ass.</i>	II.	224
Crows bane, <i>Eng.</i>	I.	55	Dhupa-lota, <i>Ass.</i>	I.	46
Custard Apple, <i>Eng.</i>	I.	43	Dia-ching, <i>Naga</i>	I.	128
			Diang-ehao, <i>Kh.</i>	II.	216
D			Dibadiang-asing, <i>Miri</i>	II.	307
Dabdabi, <i>Nep.</i>	II.	221	Dibok-pak-bidu, <i>Garo</i>	II.	286
Dahaka, <i>Sans.</i>	II.	203	Dibru, <i>Mech.</i>	II.	327
Daino, <i>Jharua</i> & <i>Dalu.</i>	I.	93	Dieng-an, <i>Kh.</i>	I.	120
Dalmugri, <i>Beng.</i>	I.	87	Dieng-bai-synrang, <i>Kh.</i>	I.	94
Dalle-kurro, <i>Nep.</i>	I.	141	Dieng-biti, <i>Kh.</i>	II.	243
Danura, <i>Beng.</i>	II.	322	Dieng-blei, <i>Kh.</i>	I.	135
Daothuli, <i>Kach.</i>	I.	55	Dieng-bora-pram, <i>Kh.</i>	II.	196
Darchong-khub, <i>Kuki</i>	I.	113	Dieng-borrah, <i>Kh.</i>	II.	337
Darichik, <i>Garo</i>	I.	89	Dieng-chandre, <i>Kh.</i>	II.	271
Darnu-asing, <i>Miri</i>	II.	333	Dieng-chhang, <i>Kh.</i>	II.	314
Datbhola, <i>Ass.</i>	I.	17	Dieng-chi, <i>Kh.</i>	I.	122
Dat-phendra, <i>Mech.</i>	I.	92	Dieng-chidit, <i>Synt.</i>	II.	328
Dauthu-kundu-phang, <i>Kach.</i>	I.	18	Dieng-chidohkha, <i>Kh.</i>	I.	92
Debdaru, <i>Beng.</i>	I.	31	Dieng-chi-soh-steing, <i>Kh.</i>	II.	280
Deibru, <i>Mech.</i>	I.	128	Dieng-dit-la-khoh, <i>Kh.</i>	I.	157
Deigir, <i>Mik.</i>	II.	207	Dieng-doh-thi, <i>Kh.</i>	I.	164
Demboranglang- changne, <i>Daff.</i>	II.	306	Dieng-dula, <i>Kh.</i>	II.	314
Demdem-ali, <i>Kuki</i>	II.	207	Dieng-duma, <i>Kh.</i>	I.	95
Demphal, <i>Tipp.</i>	I.	104	Dieng-iainnep, <i>Kh.</i>	I.	146
Denga-doti, <i>Garo</i>	I.	104	Dieng-ialeh, <i>Synt.</i>	II.	311
Dengjir-arong, <i>Mik.</i>	II.	207	Dieng-iong, <i>Kh.</i>	II.	309
Dephal, <i>Syl.</i>	I.	104	Dieng-ja-arthri, <i>Kh.</i>	II.	310
Dergi-asing, <i>Miri</i> & <i>Abor.</i>	II.	340	Dieng-jah-rasang, <i>Kh.</i>	II.	228
Dermi-asing, <i>Miri</i>	II.	329	Dieng-ja-iao, <i>Kh.</i>	II.	208
Dhamna, <i>Jharua-Garo</i> <i>Hills.</i>	I.	163	Dieng-ja-iaur, <i>Synt.</i>	II.	200
Dhapapatia, <i>Ass.</i>	II.	327	Dieng-jaior-khlaw, <i>Kh.</i>	II.	200
Dhaula-dousrem, <i>Mech.</i>	II.	299	Dieng-ja-kyba, <i>Kh.</i>	I.	97
Dhemp, <i>Ass.</i>	I.	64	Dieng-ja-la-ngap, <i>Kh.</i>	I.	129
Dheros, <i>Beng.</i>	I.	144	Dieng-jali, <i>Kh.</i>	II.	256
Dhidhao-boguri, <i>Ass.</i>	II.	281	Dieng-ja-rasi, <i>Synt.</i>	II.	310
Dhindhau-baguri-lata, <i>Ass.</i>	II.	339	Dieng-ja-rem, <i>Kh.</i>	II.	266
Dholsamudra, <i>Beng.</i>	II.	305	Dieng-ja-roi, <i>Kh.</i>	I. 31 & II.	173

	Part	Page		Part	Page
Dieng-ja-ryngam,			Dieng-la-Phyrno,		
<i>Synt.</i>	II.	312	<i>Synt.</i>	I.	122
Dieng-jermei, <i>Kh.</i>	II.	324	Dieng-la-pia, <i>Kh.</i>	II.	327
Dieng-jlih-balieh,			Dieng-lapitri-jem,		
<i>Kh.</i>	I.	123	<i>Kh.</i>	II.	251
Dieng-juwat, <i>Synt.</i>	II.	187	Dieng-la-pyrshit,		
Dieng-jwat, <i>Synt.</i>	I.	42	<i>Synt.</i>	I.	125
Dieng-kabra, <i>Synt.</i>	II.	337	Dieng-la-ranong,		
Dieng-kain, <i>Kh.</i>	II.	332	<i>Kh.</i>	I.	61
Dieng-kajat-ske,			Dieng-lari, <i>Kh.</i>	I.	18
<i>Synt.</i>	II.	205	Dieng-larnong,		
Dieng-kani, <i>Kh.</i>	I.	90	<i>Synt.</i>	I.	61
Dieng-kasiar, <i>Kh.</i>	II.	205	Dieng-lar-sei, <i>Kh.</i>	I.	31
Dieng-ka-synrang,			Dieng-lasaw,		
<i>Kh.</i>	II.	198	<i>Kh.</i>	I. 116 & II. 173	
Dieng-kean or Kain,			Dieng-lihsyrag,		
<i>Kh.</i>	II.	331	<i>Synt.</i>	II.	257
Dieng-khao-khorai,			Dieng-loba, <i>Kh.</i>	II.	323
<i>Kh.</i>	II.	249	Dieng-long-krop,		
Dieng-kniang, <i>Kh.</i>	II. 221 &	338	<i>Kh.</i>	I.	13
Dieng-khlang, <i>Kh.</i>	II.	217	Dieng-loshirnig-synrang,		
Dieng-khoh, <i>Kh.</i>	I.	157	<i>Kh.</i>	I.	95
Dieng-khong, <i>Kh.</i>	I.	42	Dieng-lyng-krong,		
Dieng-khong-swet,			<i>Kh.</i>	II.	327
<i>Kh.</i>	I.	157	Dieng-mar-iong,		
Dieng-klong, <i>Kh.</i>	I.	153	<i>Kh.</i>	II.	234
Dieng-krot, <i>Kh.</i>	II.	229	Dieng-mat-wei,		
Dieng-kya, <i>Synt.</i>	I.	147	<i>Kh.</i>	II.	270
Dieng-kymphad,			Dieng-misiri, <i>Kh.</i>	I.	146
<i>Kh.</i>	I.	147	Dieng-mulo-shi-ing,	I.	95
Dieng-kynbei, <i>Kh.</i>	II.	231	Dieng-mylliat, <i>Synt.</i>	I.	282
Dieng-la-kampied,			Dieng-myrehaw,		
<i>Synt.</i>	I.	129	<i>Kh.</i>	I.	157
Dieng-la-karu,			Dieng-nadkor, <i>Kh.</i>	II.	197
<i>Kh.</i>	I.	114	Dieng-ngai, <i>Kh.</i>	I.	111
Dieng-la-kasein khlow,			Dieng-ngan, <i>Kh.</i>	I. 119 &	120
<i>Synt.</i>	II.	218	Dieng-niang-mat,		
Dieng-la-khar, <i>Synt.</i>	II.	180	<i>Kh.</i>	I.	61
Dieng-lali, <i>Kh.</i>	II. 257 &	221	Dieng-niang-mat		
Dieng-lalih, <i>Kh.</i>	II.	257	shynrang, <i>Kh.</i>	I.	61
Dieng-Lali-iong,			Dieng-nong-know,		
<i>Kh.</i>	II.	259	<i>Kh.</i>	II.	327
Dieng-La-myrsiang,			Dieng-nor-sha, <i>Kh.</i>	I.	158
<i>Synt.</i>	II.	328	Dieng-pain-khar,		
Dieng-lang-karnum-			<i>Kh.</i>	II.	187
kynthai, <i>Kh.</i>	II.	304	Dieng-pasoh-pier,		
Dieng-lang-know,			<i>Kh.</i>	II.	338
<i>Kh.</i>	I.	137	Dieng-pen-swang,		
Dieng-lang-marei,			<i>Kh.</i>	I.	158
<i>Kh.</i>	II.	236			

	Part	Page		Part	Page
Dieng-phallam, <i>Kh.</i>	I.	34	Dieng-shong-wi-ang, <i>Kh.</i>	II.	306
Dieng-phuh-rnong, <i>Kh.</i>	I.	61	Dieng-shong-wiang- synrang, <i>Kh.</i>	II.	306
Dieng-pyllengtnam, <i>Kh.</i>	II.	187	Dieng-shleng-khlaw, <i>Kh.</i>	II.	249
Dieng-pyrshit heh, <i>Kh.</i>	I.	125	Dieng-shyr-ngan, <i>Synt.</i>	I.	119
Dieng-pyrsit, <i>Kh.</i>	I.	124	Dieng-sia, <i>Kh.</i>	I.	77
Dieng-rai, <i>Kh.</i>	I. 21, 23 & 25		Dieng-siang-mat, <i>Kh.</i>	II.	206
Dieng-rata, <i>Kh.</i>	II.	236	Dieng-sia-sah, <i>Kh.</i>	I.	180
Dieng-rewi, <i>Synt.</i>	I.	18	Dieng-sia-sohsaw, <i>Kh.</i>	I.	76
Dieng-rhi-balih, <i>Kh.</i>	I.	16	Dieng-si-ing, <i>Kh.</i>	I. & II. 95 & 195	
Dieng-rhi-basaw, <i>Kh.</i>	I.	16	Dieng-sinialh, <i>Kh.</i>	II.	202
Dieng-ri-lam, <i>Kh.</i>	I.	180	Dieng-sit-um, <i>Kh.</i>	II.	262
Dieng-rtiang-khlaw, <i>Synt.</i>	I.	23	Dieng-sla-um-pai, <i>Kh.</i>	I.	157
Dieng-ruin, <i>Synt.</i>	I.	180	Dieng-sngit, <i>Kh.</i>	II.	328
Dieng-sah-bar, <i>Kh.</i>	I.	11	Dieng-sngiyat, <i>Kh.</i>	II.	196
Dieng-sah-iaru, <i>Synt.</i>	II.	196	Dieng-sniat, <i>Synt.</i>	II.	328
Dieng-salait, <i>Synt.</i>	II.	341	Dieng-soh-aruin, <i>Kh.</i>	II.	197
Dieng-sa-la-tyrkai, <i>Synt.</i>	I.	34	Dieng-soh-bah, <i>Synt.</i>	II.	214
Dieng-sali- (Bhoi country)	II.	243	Dieng-soh-bar- synrang, <i>Kh.</i>	I.	13
Dieng-sa-ma, <i>Synt.</i>	II.	331	Dieng-soh-bhala, <i>Kh.</i>	II.	333
Dieng-sa-niriang-blai, <i>Synt.</i>	II.	249	Dieng-soh-broi, <i>Kh.</i>	II.	279
Dieng-sanyar-um, <i>Kh.</i>	I.	95	Dieng-soh-danei, <i>Kh.</i>	I.	107
Dieng-sang-kenrop, <i>Kh.</i>	II.	314	Dieng-soh-dkhap, <i>Kh.</i>	I.	180
Dieng-Sangkhlor, <i>Kh.</i>	I.	151	Dieng-soh-dkhar, <i>Kh.</i>	I. 13 & 162	
Dieng-sarumi, <i>Synt.</i>	II.	249	Dieng-soh-jadu, <i>Kh.</i>	I. 106 & 108	
Dieng-sa-slung, <i>Synt.</i>	I.	109	Dieng-soh-jalbi, <i>Kh.</i>	I.	129
Dieng-sa-tyng-klong, <i>Synt.</i>	II.	195	Dieng-soh-iaru, <i>Synt.</i>	II.	196
Dieng-saw, <i>Kh.</i>	II.	243	Dieng-soh-junmang, <i>Kh.</i>	I.	34
Dieng-saw-ngiang- jerep, <i>Kh.</i>	II.	195	Dieng-soh-kania, <i>Kh.</i>	I.	137
Dieng-shieng, <i>Kh.</i>	II.	258	Dieng-soh-karbam, <i>Kh.</i>	I.	11
Dieng-shih, <i>Kh.</i>	II.	202			
Dieng-shit, <i>Kh.</i>	I.	125			
Dieng-shong-rieng- masi, <i>Kh.</i>	II.	306			

	Part	Page		Part	Page
Dieng-soh-khijut, <i>Kh.</i>	I.	129	Dieng-soh-lormao, <i>Kh.</i>	I.	93
Dieng-son-khlam, <i>Kh.</i>	II.	200	Dieng-soh-lympied, <i>Kh.</i>	I.	129
Dieng-soh-khmut, <i>Kh.</i>	II.	221	Dieng-soh-lyngka, <i>Synt.</i>	I.	175
Dieng-soh-khru, <i>Kh.</i>	II.	311	Dieng-soh-ma, <i>Kh.</i>	II.	331
Dieng-soh-khullam, <i>Kh.</i>	I. 173 & 175		Dieng-soh-maijur, <i>Kh.</i>	II.	200
Dieng-soh-khyllam- blang, <i>Kh.</i>	II.	234	Dieng-soh-mara, <i>Kh.</i>	I	86 & 94
Dieng-soh-khyllung, <i>Kh.</i>	I.	104	Dieng-soh-mirik, <i>Kh.</i>	II.	200
Dieng-soh-khyltam- blang, <i>Kh.</i>	II.	136	Dieng-soh-mio, <i>Kh.</i>	II.	223
Dieng-soh-knurnot, <i>Kh.</i>	II.	338	Dieng-soh-mir, <i>Kh.</i>	II.	197
Dieng-soh-kwang, <i>Kh.</i>	I.	109	Dieng-soh-moniar- shree, <i>Kh.</i>	II.	322
Dieng-soh-kwang-rit, <i>Kh.</i>	I.	106	Dieng-soh-mluh, <i>Kh.</i>	I.	89
Dieng-soh-la-kampied, <i>Synt.</i>	I.	129	Dieng-soh-monashrieh, <i>Kh.</i>	II.	234
Dieng-soh-lakor, <i>Kh.</i>	I.	153	Dieng-soh-naier, <i>Kh.</i>	II.	229
Dieng-soh-lali, <i>Kh.</i>	II.	257	Dieng-soh-newriong- blei, <i>Synt.</i>	II.	203
Dieng-soh-langhri-that, <i>Kh.</i>	I.	163	Dieng-soh-ngang, <i>Kh.</i>	II.	270
Dieng-soh-langsain, <i>Synt.</i>	I.	109	Dieng-soh-niar, <i>Kh.</i>	I.	23
Dieng-soh-lap, <i>Kh.</i>	I.	87	Dieng-soh-pair (pyjer or pier), <i>Kh.</i>	II.	340
Dieng-soh-la-pied, <i>Kh.</i> <i>Synt.</i>	I. 128 & 129		Dieng-soh-pair-kanthai, <i>Kh.</i>	II.	340
Dieng-soh-la-pod, <i>Kh.</i>	I.	129	Dieng-soh-phailing, <i>Kh.</i>	I.	87
Dieng-soh-liang, <i>Kh.</i>	I.	87	Dieng-soh-phlang, <i>Kh.</i>	II. 203 & 241	
Dieng-soh-lieng-hadem, <i>Kh.</i>	I.	162	Dieng-soh-phyrun- iong, <i>Kh.</i>	II.	307
Dieng-soh-long-anthri, <i>Kh.</i>	II.	309	Dieng-soh-pien, <i>Kh.</i>	II.	335
Dieng-soh-longkor, <i>Kh.</i>	I.	108	Dieng-soh-pydem, <i>Kh.</i>	I.	17
Dieng-soh-longksan, <i>Kh.</i>	I.	105	Dieng-soh-pyjiar- syurang, <i>Kh.</i>	II.	221
Dieng-soh-long-kydaw, <i>Kh.</i>	I.	108	Dieng-soh-rang, <i>Kh.</i>	I.	93
Dieng-soh-longor, <i>Kh.</i>	II.	239	Dieng-soh-riang-mat- kynthei, <i>Kh.</i>	I.	61
			Dieng-soh-run-blang, <i>Kh.</i>	II.	234
			Dieng-soh-ryn-dan, <i>Kh.</i>	I.	104

	Part	Page		Part	Page
Dieng-soh-salait,			Dieng-syrngam, <i>Kh.</i>	II	208
<i>Synt.</i>	II.	341	Dieng-tha-baluh,		
Dieng-soh-sang-kei,			<i>Kh.</i>	I.	163
<i>Kh.</i>	II.	309	Dieng-than, <i>Kh.</i>	II.	312
Dieng-soh-sarlain,			Dieng-thang, <i>Kh.</i>	II.	338
<i>Synt.</i>	I.	101	Dieng-thang-khaphiah,		
Dieng-soh-sarman,			<i>Kh.</i>	I.	177
<i>Synt.</i>	II.	213	Dieng-tharo-masi,		
Dieng-soh-sat, <i>Kh.</i>	II.	208	<i>Kh.</i>	I.	157
Dieng-soh-sat-khlaw,			Dieng-ther, <i>Kh.</i>	I.	32
<i>Kh.</i>	II.	263	Dieng-thlai-nar,		
Dieng-soh-saw, <i>Kh.</i>	II.	257	<i>Kh.</i>	II.	335
Dieng-soh-sma, <i>Kh.</i>	II.	331	Dieng-tnnat-syar,		
Dieng-soh-sning,			<i>Synt.</i>	II.	202
<i>Kh.</i>	II.	205	Dieng-thyllong,		
Dieng-soh-swit,			<i>Kh.</i>	I.	95
<i>Synt.</i>	I.	106	Dieng-tiew-sat, <i>Kh.</i>	I.	164.
Dieng-soh-syrtet,			Dieng-tiew-ser, <i>Kh.</i>	I.	164
<i>Kh.</i>	II.	257	Dieng-tiew-sier, <i>Kh.</i>	I.	165
Dieng-soh-tanghi,			Dieng-tilut, <i>Kh.</i>	II.	247
<i>Synt.</i>	II.	312	Dieng-tiw-la-neluh,		
Dieng-soh-tlai-shree,			<i>Kh.</i>	I.	117
<i>Synt.</i>	II.	208	Dieng-tiw-shiah,		
Dieng-soh-tong-klong,			<i>Kh.</i>	II.	202
<i>Synt.</i>	II.	195	Dieng-tylleng, <i>Kh.</i>	II.	243
Dieng-soh-treng,			Dieng-tyrbhong,		
<i>Kh.</i>	II.	192	<i>Kh.</i>	I.	165
Dieng-soh-tylluh,			Dieng-tyrkhum, <i>Kh.</i>	I.	156 & 312
<i>Kh.</i>	I.	95	Dieng-tyrlang, <i>Kh.</i>	II.	257
Dieng-soh-tynka,			Dieng-tyrlong-kynthie,		
<i>Kh.</i>	I.	97	<i>Kh.</i>	II.	258
Dieng-soh-tyrlong,			Dieng-tyrnem, <i>Kh.</i>	I.	123
<i>Kh.</i>	II.	257	Dieng-tyrnem-bhoi,		
Dieng-son-tyrlong-			<i>Kh.</i>	I.	123
kynthi, <i>Kh.</i>	II.	258	Dieng-tyrnem-syn-		
Dieng-song-wi-ang,			rang, <i>Kh.</i>	I.	122
<i>Kh.</i>	II.	306	Dieng-tynpei, <i>Kh.</i>	II.	208
Dieng-sormi, <i>Synt.</i>	II.	251	Dieng-tyrthia-iong,		
Dieng-spieng-rah,			<i>Kh.</i>	II.	312
<i>Synt.</i>	II.	320	Dieng-tyrur, <i>Kh.</i>	II.	206
Dieng-star, <i>Kh.</i>	I.	151	Dieng-tyrut, <i>Kh.</i>	II.	247
Dieng-subu-klong,			Dim-soh-doukha,		
<i>Synt.</i>	II.	196	<i>Cach.</i>	I.	160
Dieng-sugsi, <i>Synt.</i>	II.	187	Dim-tri-rang-rikang,		
Dieng-suit, <i>Synt.</i>	II.	332	<i>Mik.</i>	I.	182
Dieng-sur, <i>Kh.</i>	II.	338	Dingari, <i>Mech.</i>	II.	232 & 313
Dieng-symphior, <i>Kh.</i>	I.	151	Dingari-guphut,		
Dieng-syntiw-sanam,			<i>Mech.</i>	II.	232
<i>Kh.</i>	I.	101	Dingi-bomphang,		
Dieng-syr-ah, <i>Kh.</i>	I.	147	<i>Mech.</i>	II.	232

	Part	Page		Part	Page
Dingrali-arong,			Gahori-sopa, <i>Ass.</i>	I.	14
<i>Mik.</i>	II.	245	Galdua, <i>Ass.</i>	I.	51
Dingso-kwang, <i>Kh.</i>	I.	110	Galing-asing, <i>Abor.</i>		
Dire-asing, <i>Abor.</i>	II.	237	& <i>Miri</i>	II. 208, 232 &	237
Dodekhi-thong,			Galing-libor, <i>Miri</i>		
<i>Garó</i>	II.	321	& <i>Abor.</i>	II.	231
Doloi-champa, <i>Cach.</i>	I.	13	Galronga, <i>Ass.</i>	I.	178
Dome, <i>Garó</i>	II.	338	Galua, <i>Naga</i>	II.	236
Dong-kh reng,			Gana-grjo, <i>Nep.</i>	I.	52
<i>Garó.</i>	II.	225	Ganga-thaisip,		
Dong-phang-thai,			<i>Mech.</i>	I.	77
<i>Naga</i>	I.	11	Gangma-chhangoppa,		
Dou-shrem, <i>Mech.</i>	II.	286	<i>Garó</i>	II.	305
Down-rang, <i>Kuki</i>	II.	291	Gangmai, <i>Garó</i>	I.	173
Ducheng-brup,			Gangmaiaching,		
<i>Garó</i>	II.	339	<i>Garó</i>	II.	309
Dugithang, <i>Garó</i>	II.	280	Gangma-jachheng,		
Dugrak, <i>Garó</i>	II.	188	<i>Garó</i>	I.	177
Dugrak-hudu,			Gangma-jachheng,		
<i>Garó</i>	II.	188	<i>Garó</i>	II.	304
Duk-duki, <i>Tipp.</i>	I.	89	Gangma-jachni,		
Dukhenda, <i>Mech.</i>	I.	92	<i>Garó</i>	II.	306
Dukhundu-phang,			Gangma-sangop,		
<i>Cach.</i>	I.	151	<i>Garó</i>	II.	304
Dumakhal, <i>Garó</i>	I.	46	Gangru-changne,		
Dumakpul, <i>Garó</i>	II.	281	<i>Daff.</i>	II.	237
Dume, <i>Garó</i>	II.	338	Ganth-kobi, <i>Hind.</i>	I.	69
Dumi, <i>Garó</i>	II.	221	Gapenda, <i>Garó</i>	II.	329
Dumigong, <i>Garó</i>	II.	286	Garden pansy, <i>Eng.</i>	I.	81
Dum-soh-doukha,			Garó-sal, <i>Mech.</i>	II.	281
<i>Cach.</i>	I.	160	Gaurchikrai, <i>Ass.</i>	I.	125
Durong-phang,			Gauri-sopa, <i>Ass.</i>	I.	14
<i>Kach.</i>	I.	150	Gelomtaru, <i>Daff.</i>	II.	269
Durujje-doukha,			Gendheli-poma,		
<i>Cach.</i>	II.	296	<i>Ass.</i>	II.	231
Dusi-phri, <i>Garó</i>	I.	160	Generu-ay, <i>Miri</i>	II.	214
Dusismmak, <i>Garó</i>	II.	190	Geng-sning, <i>Garó</i>	I.	128
			Gerela-sopa, <i>Ass.</i>	I.	177
E			Ghora-nim, <i>Ass. &</i>		
Eng-gokmi, <i>Garó</i>	II.	236	<i>Beng.</i>	II.	228
E n g l a, <i>Sylh.</i>	&		Gimbao, <i>Kach.</i>	II.	331
<i>Cach.</i>	II. 221 &	223	Ginger tree, <i>Eng.</i>	I.	95
Eye-ball-tree, <i>Eng.</i>	II.	323	Gingsimok, <i>Garó</i>	II.	228
			Goalia-lata, <i>Beng.</i>	II.	302
F			Gobar-khutla, <i>Ass.</i>	II.	309
Fish-bone, <i>Eng.</i>	I.	92	Gobor-hura, <i>Ass.</i>	II.	208
			Gobor-huti, <i>Ass.</i>	II.	208
G			Goch-poniol, <i>Ass.</i>	I.	89
Gaban, <i>Nep.</i>	I.	129	Gogoi-champ, <i>Nep.</i>	I.	22
Gach-gangma, <i>Ass.</i>	II.	306			

	Part	Page		Part	Page
Gogon, <i>Nep.</i>	I.	128	Han-maljiangarong,		
Gokul, <i>Nep.</i>	II. 224 &	236	<i>Mik.</i>	II.	247
Goldari, <i>Nep.</i>	II.	262	Han-misang, <i>Mik.</i>	II.	247
Golthi-arong, <i>Mik.</i>	I.	38	Hansrong, <i>Mik.</i>	I.	144
Gongmajaching,			Hanti-pi-arong,		
<i>Garó</i>	II.	309	<i>Mik.</i>	I.	144
Gorap-choi, <i>Ass.</i>	I.	6	Harbi-beh, <i>Mik.</i>	II.	241
Goria-loti, <i>Ass.</i>	I.	52	Harbi-ben-arong,		
Gorukhia-koroi,			<i>Mik.</i>	II.	242
<i>Ass.</i>	I. 143 &	156	Harenga, <i>Beng.</i>	II.	290
Gowalia-lata,			Haribe, <i>Mik.</i>	II.	241
<i>Beng.</i>	II.	293	Harjora, <i>Beng.</i>	II.	290
Gugra, <i>Mech.</i>	I.	119	Harpulli, <i>Beng.</i>	I.	318
Gulanha, <i>Beng.</i>	I.	54	Hati-kerepa, <i>Ass.</i>	II.	256
Gurban-asing, <i>Miri</i>			Hati-paile, <i>Nep.</i>	I.	157
& <i>Abor.</i>	II.	327	Hatipeala, <i>Ass.</i>	I.	157
Gurjan oil tree,			Hatronga, <i>Ass.</i>	I.	83
<i>Eng.</i>	I.	134	Hau, <i>Cach.</i>	I.	105
			Heartsease, <i>Eng.</i>	I.	81
H			Hebui-bang, <i>Naga</i>	I.	147
Habbeil-mishk,			Hechui-ching,		
<i>Ass.</i>	I.	143	<i>Naga</i>	II.	197
Habida-cha (wild			Hed-bheduli, <i>Ass.</i>	I.	48
tea) <i>Mik.</i>	I.	33	Heining, <i>Manip.</i>	II.	340
Hagrani-sa, <i>Cach.</i>	I.	90	Heinohjom, <i>Manip.</i>	II.	192
Haibamin, <i>Tipp.</i>	II.	336	Heitup, <i>Manip.</i>	I.	162
Haibung, <i>Manip.</i>	I.	109	Hekokeko, <i>Ass.</i>	II.	321
Haidai, <i>Tipp.</i>	II.	335	Hengela, <i>Sylh.</i>	I.	321
Haijange, <i>Manip.</i>	II.	313	Hengena-poka,		
Haitaguti, <i>Miri</i>	II.	320	<i>Ass.</i>	II.	205
Haithal-bang,			Hengla, <i>Cach.</i>	II.	223
<i>Cach.</i>	II.	320	Hengna-poka, <i>Ass.</i>	II.	205
Haithna-poma,			Henguna, <i>Ass.</i>	II.	329
<i>Sylh.</i>	II.	241	Hengunia, <i>Ass.</i>	I.	128,
Hakhori-bakhori,				II. 327 &	329
<i>Ass.</i>	II.	236	Heppaching, <i>Naga</i>	I.	146
Hal, <i>Ass.</i>	I.	135	Heppuk-bang, <i>Naga</i>	I.	151
Hal-arong, <i>Mik.</i>	I.	135	Heren-thak-chi-ching,		
Halim, <i>Hind. &</i>			<i>Naga</i>	II.	232
<i>Beng.</i>	I.	71	Hero-changne, <i>Daff.</i>	I.	130
Hamoi-tenga, <i>Ass.</i>	II.	341	Herse, <i>Lush.</i>	I.	111
Hampur-arong,			Hiegri, <i>Manip.</i>	I.	11
<i>Mik.</i>	II.	214	Hijung, <i>Mik.</i>	II.	225
Han-bo-akarang,			Hijung-arong, <i>Mik.</i>	II.	224
<i>Mik.</i>	I.	92	Hilaguti-gach,		
Han-boka, <i>Mik.</i>	II.	247	<i>Ass.</i>	II.	208
Hang-ding, <i>Mik.</i>	II.	338	Himila, <i>Ass.</i>	I.	147
Han-hodak, <i>Mik.</i>	II.	228	Himolu, <i>Ass.</i>	I.	147
Hanjon, <i>Mik.</i>	II.	197	Hinghi, <i>Kuki</i>	II.	320
Han-kanoj, <i>Mik.</i>	II.	247	Hinguri, <i>Ass.</i>	II.	270

	Part	Page		Part	Page
Jermei-slang-ruin, <i>Synt.</i>	II.	299	Jyrmi-soh-ram-khlow, <i>Kh.</i>	I.	47
Jermi-neirang-chhai, <i>Kh.</i>	II.	324		K	
Jethou, <i>Kuki</i>	I.	31	Ka-chali, <i>Kh.</i>	II.	190
Jhapa, <i>Ass.</i>	I.	140	Kachidohkka, <i>Kh.</i>	I.	92
Jhari-udal, <i>Ass.</i>	I.	151	Kadeng-srang-arong, <i>Mik.</i>	II.	178
Jhau, <i>Beng. & Ass.</i>	I.	99	Kai-engla, <i>Sylh.</i>	II.	338
Jhawa, <i>Sylh.</i>	II.	337	Kakamari, <i>Sans.</i>	I.	55
Jhingpi-arung-otwang, <i>Mik.</i>	I.	39	Kakin, <i>Kh.</i>	II.	332
Jhinjharita, <i>Sans.</i>	I.	168	Kakmari, <i>Beng.</i>	I.	55
Jhinuk, <i>Sylh.</i>	I.	156	Kaksok, <i>Tipp.</i>	II.	232
Jia, <i>Ass.</i>	II.	338	Kakso-kchal, <i>Kuki</i>	II.	232
Jia-poma, <i>Ass.</i>	II.	242	Kak-sok-thing, <i>Kuki</i>	II.	236
Jiga, <i>Jharua</i>	II.	338	Kakura, <i>Sylh.</i>	I.	144
Jika, <i>Jharua</i>	II.	338	Kala-dingart, <i>Mech.</i>	II.	309
Jingir-phang, <i>Cach.</i>	II.	197	Kalang-asing, <i>Miri</i>	I.	137
Jingni, <i>Sans.</i>	II.	338	Kalikath, <i>Nep.</i>	I.	32
Jinje-kong, <i>Mik.</i>	I.	151	Kalwang, <i>Beng.</i>	I.	48
Jiri, <i>Garó</i>	I.	31	Kamini, <i>Beng.</i>	II.	207
Jirmi, <i>Kh.</i>	I.	160	Kampi-bumtal-arong, <i>Mik.</i>	I.	87
Jiyal, <i>Beng. & Sylh.</i>	II.	338	Kamranga, <i>Beng.</i>	II.	192
Joba <i>Ass. & Beng.</i>	I.	145	Kamsuri, <i>Kach.</i>	I.	119
Joba-hingori, <i>Ass.</i>	II.	182	Kanchana, <i>Sans.</i>	II.	203
Jolandhar, <i>Ass.</i>	I.	83	Kang-mari, <i>Manip.</i>	I.	29
Jong-kitil-thing, <i>Kuki</i>	II.	318	Kankatika, <i>Sans.</i>	I.	140
Jong-long-rhui, <i>Lush.</i>	I.	160	Kapalphuta, <i>Ass.</i>	II.	313
Jong-mel, <i>Kuki</i>	II.	241	Karai, <i>Garó</i>	I.	111
Jong-mochal, <i>Kuki</i>	I.	32	Karle-phingnu, <i>Mik.</i>	I.	49
Jong-mot, <i>Kuki</i>	I.	39 & 60	Karnakhar, <i>Tipp.</i>	I.	177
Jong-mot-kung, <i>Tipp.</i>	I.	39	Karnikara, <i>Sans.</i>	I.	157
Jongphang, <i>Tipp.</i>	I.	10	Karol, <i>Cach.</i>	I.	113
Jong-sia, <i>Garó</i>	I.	73	Karo-phang, <i>Kach.</i>	I.	18
Jora-bhanora, <i>Ass.</i>	I.	42	Kasshok, <i>Kuki</i>	II.	231
Jora-tenga, <i>Ass.</i>	I.	213	Kasukorol, <i>Cach.</i>	I.	113
Jor-lewa, <i>Ass.</i>	I.	34	Kata-holi, <i>Ass.</i>	I.	90
Jowmakhon, <i>Mik.</i>	I.	93	Kata-ponial, <i>Ass.</i>	I.	90
Jur-thoumthing, <i>Kuki</i>	II.	197	Katabel, <i>Lush.</i>	I.	337
Jwarpat, <i>Ass.</i>	II.	286	Kath-lechi, <i>Ass.</i>	II.	323
Jyrmai-lasam, <i>Kh.</i>	I.	6	Kath-thengia, <i>Ass.</i>	II.	304
Jyrmibytengdoh, <i>Kh.</i>	I.	4	Kath-udal, <i>Ass.</i>	I.	151
Jyrmi-mailum, <i>Kh.</i>	I.	57	Katum-asing, <i>Abor.</i>	II.	231
Jyrmi-salla, <i>Kh.</i>	I.	52	Kail, <i>Sylh., Cach., Manip. & Naga</i>	I.	105
			Kaugach, <i>Ass.</i>	I.	105

	Part	Page		Part	Page
Kau-thejera, <i>Ass.</i>	I.	105	Khirkha-champa,		
Kebu-taye, <i>Abor.</i>	II.	206	<i>Mech.</i>	I.	137
Kechkechi, <i>Ass.</i>	II.	221	<i>Khitma, Garo</i>	II.	331
Keidi-asing, <i>Miri</i>	II.	335	<i>Khoirao, Naga</i>	II.	322
Kengrapel, <i>Kuki</i>	I.	106	<i>Khokma-thing,</i>		
Keotai, <i>Ass.</i>	II.	231	<i>Kuki</i>	II.	331
Kerek-lata, <i>Ass.</i>	II.	188	<i>Khongkhammakbul,</i>		
Kerewal, <i>Kuki</i>	II.	228	<i>Garo</i>	II.	281
Kerkeri-lata, <i>Ass.</i>	II.	298	<i>Khorika-sopa, Ass.</i>	I.	18
Keyo-asing, <i>Abor.</i>	I.	137	<i>Khorokia-sopa,</i>		
Khag-man-chi,			<i>Ass.</i>	I.	15
<i>Tipp.</i>	II.	229	<i>Khoro-soi-rikang,</i>		
Khai-engla, <i>Sylh.</i>	II.	338	<i>Mik.</i>	I.	6
Khai-pang-thing,			<i>Khranchi, Garo</i>	II.	241
<i>Kuki</i>	I.	150	<i>Khrang, Mik.</i>	II. 231, 232 &	239
Kham, <i>Lush.</i>	I.	37			
Khamari, <i>Nep.</i>	I.	153	<i>Khrang-arong,</i>		
Kham-khor, <i>Garo</i>	I.	137	<i>Mik.</i>	II.	309
Khamoli-mola,			<i>Khrang-kelok-arong,</i>		
<i>Ass.</i>	II.	341	<i>Mik.</i>	II.	232
Khamoli-sali, <i>Ass.</i>	II.	341	<i>Khrankerarong,</i>		
Khandou, <i>Mech.</i>	I.	31	<i>Mik.</i>	II.	234
Khangkher, <i>Mech.</i>	II.	313	<i>Khungkha-biphang,</i>		
Khangkhir khola,			<i>Mech.</i>	I.	87
<i>Mech.</i>	II.	313	<i>Khung-khari-baphang,</i>		
<i>hankhri-wakbuk,</i>			<i>Kach.</i>	I.	111
<i>Garo</i>	II.	281	<i>Khuranchi, Garo</i>	II.	322
<i>Knarkha, Garo</i>	I.	51	<i>Khusuguchhi,</i>		
<i>Kharo-an, Kuki</i>	I.	92	<i>Aka.</i>	II.	281
<i>Khasre, Nep.</i>	I.	169	<i>Kichejanthar, Mik.</i>	II.	223
<i>Khati, Garo</i>	II.	337	<i>Kimbou-phang,</i>		
<i>Khatmai, Cach.</i>	II.	242	<i>Kach.</i>	II.	243
<i>Khatmai-phang,</i>			<i>Kirta-kirpang, Abor.</i>	I.	87
<i>Cach.</i>	II. 243 &	244	<i>Kisianthor-arong,</i>		
<i>Khatoksi, Mech.</i>	I.	105	<i>Mik.</i>	II.	223
<i>Khau-khlem-maising-</i>			<i>Knolkhol, Beng. &</i>		
<i>phang, Cach.</i>	I.	164	<i>Hind.</i>	I.	69
<i>Khau-khlem-marse,</i>			<i>Koaso, Naga</i>	II.	328
<i>Cach.</i>	I.	164	<i>Kobaraiching, Naga</i>	I.	18
<i>Khel-rel-thing, Tipp.</i>	I.	92	<i>Kogema-iaopa-phang,</i>		
<i>Khem-judi, Kach.</i>	I.	32	<i>Mech.</i>	II.	203
<i>Khengkhiwakbik,</i>			<i>Koipura, &</i>		
<i>Garo</i>	I.	163	<i>Syn.</i>	I. & II.	162 & 317
<i>knerai, Manip.</i>	II.	337			
<i>Kherjong, Tipp.</i>	I.	134	<i>Koitur, Lush. &</i>		
<i>Khersei, Tipp.</i>	I.	111	<i>Kuki</i>	I.	87
<i>Kherser, Kuki</i>	I.	111	<i>Kola-knamtou,</i>		
<i>Khetma, Garo</i>	II.	331	<i>Ass.</i>	I.	32
<i>Khimdabeng, Garo</i>	II.	219	<i>Kola-sopa, Ass.</i>	I.	14
<i>Khimdi, Garo</i>	I.	111	<i>Koliori, Ass.</i>	I.	32 & 38

	Part	Page		Part	Page
Kolong-asing, <i>Miri</i>	&			L	
<i>Abor.</i>	II.	207	Labsni, <i>Nep.</i>	II.	341
Kolti, <i>Ass.</i>	I.	38	La-cnampa, <i>Synt.</i>	I.	22
Komal-siuli, <i>Nep.</i>	II.	229	Lady's finger, <i>Eng.</i>	I.	144
Komker-asing, <i>Miri</i>			Lahi, <i>Ass.</i>	I.	69
& <i>Abor.</i>	II.	224	Lahripoma, <i>Ass.</i>	II.	241
Kongla-arong, <i>Mik.</i>	I.	157	Lai, <i>Ass.</i>	I.	69
Kong-krowai, <i>Kuki</i>	I.	142	Laidar, <i>Mech.</i>	I.	157
Kongkulu, <i>Mik.</i>	I.	151	Laidoibru, <i>Mech.</i>	II.	327
Konkelu, <i>Mik.</i>	I.	153	Laidorbuphang,		
Kopah, <i>Ass.</i>	I.	145	<i>Cach.</i>	I.	157
Korbomba, <i>Kuki</i>	I.	107	Laigeran, <i>Kach.</i>	I.	17
Kordoi, <i>Ass.</i>	II.	192	Laigungron, <i>Mech.</i>	I.	17
Korjong, <i>Kuki</i>	I.	134	Lai-kulai-phang,		
Koroiphula, <i>Sylh.</i>	II.	208	<i>Cach.</i>	I.	158
Koronga, <i>Ass.</i>	II.	216	Lai-makhan-phang,		
Koshta, <i>Beng.</i>	I.	169	<i>Kach.</i>	I.	18
Kota-har, <i>Ass.</i>	I.	77 & 90	Laiman-phang, <i>Cach.</i>	I.	163
Kothal-pathia-sopa,			Lairouthon-buphang,		
<i>Ass.</i>	I.	19	<i>Cach.</i>	I.	13
Kothal-sopa, <i>Ass.</i>	I.	24	Lakap, <i>Naga</i>	I.	14
Kothalua-sopa, <i>Ass.</i>	I.	25	Lakhul-guta, <i>Jharua</i>	I.	162
Kothamari, <i>Garó</i>	II.	309	Lakshmi-am, <i>Sylh.</i>	&	
Kotoki, <i>Ass.</i>	II.	256	<i>Cach.</i>	II.	336
Kotra, <i>Ass.</i>	I.	146	Lalang-baiong,		
Koulkar, <i>Lush.</i>	II.	308	<i>Jaintia</i>	II.	216
Koying, <i>Nep.</i>	I.	173	Lali, <i>Ass.</i>	II.	231 & 241
Kram-sim-doukha,			Lal-jhau, <i>Beng.</i>	&	
<i>Kach.</i>	I.	61	<i>Ass.</i>	I.	99
Krang-sin-dowha,			Lal-kaipura, <i>Beng.</i>	&	
<i>Kach.</i>	I.	60	<i>Sylh.</i>	II.	321
Kron-suri-arong,			Lalruna-buphai-thup,		
<i>Mik.</i>	I.	93	<i>Lush.</i>	II.	254
Kuakla, <i>Manip.</i>	I.	157	Lamakur, <i>Tipp.</i>	I.	137
Kubinde, <i>Nep.</i>	I.	146	Lamtem, <i>Ass.</i>	I.	87
Kuhumkanta, <i>Ass.</i>	I.	66	Lang-kuru, <i>Kh.</i>	II.	308
Kuji-thekera, <i>Ass.</i>	I.	105 & 107	Langlu-chikong-arong,		
Kukuha, <i>Ass.</i>	I.	146	<i>Mik.</i>	I.	18
Kukurathengia,			Langta-krem, <i>Kh.</i>	II.	282
<i>Ass.</i>	II.	307	Larsej-kynthei, <i>Kh.</i>	I.	16
Kukur-huta, <i>Ass.</i>	I.	165	Larubanda, <i>Ass.</i>	I.	157 & 169
Kulamari, <i>Garó</i>	II.	309	Larubandha, <i>Ass.</i>	II.	327
Kuma, <i>Synt.</i>	II.	243	Lasyn-heh, <i>Kh.</i>	I.	100
Kumtin-toi, <i>Lush.</i>	II.	308	La-syn-rit, <i>Kh.</i>	I.	101
Kumuda, <i>Sans.</i>	I.	64	Lata-kasturika,		
Kunja-shia-khuai,			<i>Sans.</i>	I.	143
<i>Kh.</i>	II.	202	Lata-kuti, <i>Garó</i>	I.	160
Kuroil, <i>Synt.</i>	I.	134	Latkan, <i>Beng.</i>	I.	83
Kuroilsal, <i>Cach.</i>	I.	134	Lau-gongrai-baphang,		
Kynja-jakrai, <i>Kh.</i>	II.	259	<i>Cach.</i>	I.	157

	Part	Page		Part	Page
Lavanga-lata,			Makhang-thing,		
<i>Beng.</i>	II.	209	<i>Kuki</i>	II.	241
Lehau, <i>Manip.</i>	I.	177	Makhamsra-phang,		
Leikham, <i>Manip.</i>	I.	37	<i>Kach.</i>	I.	33
Lekam-arong, <i>Mik.</i>	I.	172	Makhaiho, <i>Garó</i>	II. 233 &	234
Lek-chutra, <i>Nep.</i>	I.	61	Makria, <i>Ass.</i> (Bot. name)		
Lemtem, <i>Ass.</i>	I.	87	<i>Schima Wallichii</i>	I.	119
Lesi, <i>Ass.</i>	II.	323	Malaphanga, <i>Cach.</i>	II.	197
Ling-kemrang,			Malkagni, <i>Beng.</i> &		
<i>Tipp.</i>	II.	280	<i>Hind.</i>	II.	268
Ling-kun, <i>Lush.</i>	II.	207	Mamoi, <i>Ass.</i>	II.	329
Ling-seru, <i>Kuki</i>	II.	203	Man-bijal, <i>Ass.</i>	I.	163
Ling-uom, <i>Kuki</i>	I.	77	Mandamai, <i>Cach.</i>	II.	338
Lisi, <i>Ass.</i>	II.	323	Mandiphang, <i>Kach.</i>	I.	11
Loi-emba-lei,			Mandri, <i>Garó</i>	II.	325
<i>Manip.</i>	I.	74	Mangie-thing, <i>Kuki</i>	I.	11
Lojangthu, <i>Mik.</i>	II.	248	Mangkhrom, <i>Garó</i>	II.	305
Lokong-krong-arong,			Mango tree, <i>Eng.</i>	II.	335
<i>Mik.</i>	I.	157	Manichal, <i>Miri.</i>	II.	320
Long-phul, <i>Ass.</i>	II.	209	Man-khing, <i>Kuki</i>	I.	119
Lopoklok-arong,			Man-khing-thing,		
<i>Mik.</i>	I.	157	<i>Tipp.</i>	I.	119
Ludrai, <i>Sylh.</i> &			Man-lang-rang,		
<i>Tipp.</i>	I.	172	<i>Kuki</i>	I.	160
Ludrok, <i>Garó</i>	I.	172	Manthiang, <i>Kuki</i>	I.	119
Ludurai-asing, <i>Miri</i> &			Mao-marli, <i>Ass.</i>	I.	142
<i>Abor.</i>	I.	172	Maonl, <i>Tipp.</i>	I.	79
Lukluki, <i>Sylh.</i>	I.	89	Markingnut tree,		
Luvunga lata, <i>Sans.</i>	II.	209	<i>Eng.</i>	II.	333
M			Marli-arong, <i>Mik.</i>	II.	323
Machli-poma,			Marli-thing, <i>Kuki</i>	II.	323
<i>Sylh.</i>	II.	195	Marsusepel, <i>Garó</i>	II.	208
Madabai, <i>Cach.</i>	II.	338	Masispel, <i>Garó</i>	II.	232
Madhabi-lota, <i>Sans.</i> ,			Masribu, <i>Garó</i>	II.	87
<i>Beng. & Manip.</i>	II.	188	Masru-siphe,		
Madhabimalati,			<i>Garó</i>	II.	234
<i>Ass.</i>	I.	79	Mata, <i>Kuki</i>	I.	87
Madhuduta, <i>Sans.</i>	II.	335	Matbul-jappa, <i>Garó</i>	I.	157
Madhumalati,			Matiar-stem, <i>Kh.</i>	I.	100
<i>Ass.</i>	I.	79	Matkhila, <i>E. Beng.</i>	II.	205
Mahabala, <i>Sans.</i>	I.	140	Matta, <i>Lushai</i> &		
Mahanim, <i>Beng.</i> &			<i>Tipp.</i>	I.	87
<i>Ass.</i>	II.	228	Mauhidai, <i>Cach.</i>	II.	231
Maiki-bandardima,			Medmedia-lot,		
<i>Ass.</i>	II.	321	<i>Ass.</i>	II.	292
Maiphak, <i>Ass.</i>	II.	195	Mei-bynoh, <i>Kh.</i>	II.	277
Makai, <i>Ass.</i>	I.	136	Mei-byteng-doh.		
Makhaibo, <i>Garó</i>	II.	231	<i>Kh.</i>	I.	5
Makhang, <i>Kuki</i>	II.	270	Mei-hur-jarap.		
			<i>Kh.</i>	II.	290

	Part	Page		Part	Page
Mei-jong, <i>Kh.</i>	I.	4	Mirang-k'sa, <i>Kh.</i>	I.	61
Mei-jaior, <i>Kh.</i>	I.	130	Mirchesu, <i>Mik.</i>	II.	323
Mei-ja-khajrap,			Mirchobe, <i>Mik.</i>	I.	180
<i>Kh.</i>	II.	290	Mirchobi, <i>Mik.</i>	I.	177
Mei-jendru, <i>Kh.</i>	II.	268	Mirgach, <i>Ass.</i>	II.	323
Meiklong, <i>Kh.</i>	I.	160	Miri, <i>Garo</i>	II.	325
Mei-la-lih, <i>Kh.</i>	II.	268	Miri-komker-asing,		
Mei-lih, <i>Kh.</i>	I.	5	<i>Miri & Abor.</i>	I.	176
Mei-long-kydup, <i>Kh.</i>	I.	3	Mir-kom-phor, <i>Mik.</i>	I.	137
Mei-rong-tom, <i>Kh.</i>	II.	283	Mirtenga, <i>Ass.</i>	II.	223
Mei-ryn-nao, <i>Kh.</i>	II.	278	Misai-athep, <i>Kach.</i>	II.	207
Mei-shein, <i>Kh.</i>	II.	188	Misen-baphang,		
Mei-si-ing, <i>Kh.</i>	I.	4	<i>Cach.</i>	II.	247
Mei-slah, <i>Kh.</i>	I.	160	Misi-chik-udari,		
Mei-soh-khan, <i>Kh.</i>	I.	130	<i>Garo</i>	I.	153
Mei-soh-khar-khlaw,			Misi-mugrong-		
<i>Kh.</i>	II.	211	buphang, <i>Kach.</i>	I.	142
Mei-soh-mynjiriang,			Mi-soh-iong-rit, <i>Kh.</i>	I.	51
<i>Kh.</i>	II.	299	Misser, <i>Tipp.</i>	II.	213
Mei-tein-iang, <i>Kh.</i>	II.	286	Mi-syntneg, <i>Kh.</i>	I.	52
Mei-thit, <i>Kh.</i>	II.	189	Mithaichora, <i>Sylh.</i>	I.	165
Mekai, <i>Ass.</i>	I. 134 &	136	Mithang-samjia,		
Mekahi, <i>Ass.</i>	I.	136	<i>Cach.</i>	I.	164
Mekrup, <i>Mamib.</i>	I. 137 & II.	224	Mithi-phang-thing,		
Mekuridima, <i>Ass.</i>			<i>Kuki</i>	II.	247
(Chickrassia tabu-			Moal, <i>Sylh.</i>	I.	137
laris)	II.	241	Modon-phang, <i>Kach.</i>	I.	146
Mengchuri-arong,			Modubura, <i>Cach.</i>	&	
<i>Mik.</i>	I.	31	<i>Sylh.</i>	I.	157
Meruang-omak,			Moen, <i>Garo</i>	II.	247
<i>Garo</i>	I.	34	Mogchouphang,		
Mezenga, <i>Ass.</i>	II.	201	<i>Cach.</i>	II.	241
Mibol, <i>Garo</i>	I.	153	Mohal, <i>Cach.</i>	I.	137
Mibonju, <i>Kach.</i>	I.	74	Moja-kotta, <i>Daff.</i>	I.	48
Micharne, <i>Mik.</i>	I.	111	Mokuwa, <i>Ass.</i>	I.	64
Midauma-baphang,			Moragos, <i>Ass.</i>	I.	157
<i>Cach.</i>	II.	194	Morakur, <i>Lush.</i>	I.	137
Midi-takkir, <i>Miri</i>			Morhal, <i>Ass.</i>	I.	137
& <i>Abor.</i>	II.	339	Morra, <i>Ass.</i>	I.	157
Midoubri-doukha,			Mota-amari, <i>Ass.</i>	II.	309
<i>Kach.</i>	II.	285	Mota-bhe, <i>Ass.</i>	II.	311
Midouma-phang,			Mota-bokol-bih, <i>Ass.</i>	I.	46
<i>Kach.</i>	I.	92	Mota-koli, <i>Ass.</i>	I.	90
Mi-ja-ngew, <i>Kh.</i>	I.	29	Mota-marulia, <i>Ass.</i>	I.	157
Mi-keroat, <i>Kh.</i>	II.	268	Mota-nahor, <i>Ass.</i>	I.	158
Mikir-asing, <i>Miri</i>	I.	31	Mota-puli, <i>Ass.</i>	&	
Mikir-lata-phang,			<i>Miri</i>	I.	90
<i>Cach.</i>	I.	163	Mouksa-anislam-		
Mimongoomak,			phang, <i>Kuki</i>	II.	236
<i>Garo</i>	I.	153	Muga-phang, <i>Kach.</i>	I.	173

	Part	Page		Part	Page
Muka-asing, <i>Abor.</i>	II.	195 & 196	Naya-phatki, <i>Beng.</i>	II.	313
Mula, <i>Hind., Beng.</i>	I.	71	Nekung-riubi, <i>Miri</i>	II.	297
Muli, <i>Hind., Beng.</i>	I.	71	Nelo-changne, <i>Daff</i>	I.	93
Mulkiber-doukha,			Neoli, <i>Mech.</i>	II.	223
<i>Kach.</i>	II.	203	Newraji-doukha,		
Munde-phang, <i>Kach.</i>	I.	11	<i>Kach.</i>	II.	203
Mura-pat, <i>Ass.</i>	I.	169	Ngai-ching, <i>Naga</i>	I.	111
Murmura, <i>Ass.</i>	I.	124 & 125	Ngasentur, <i>Kuki</i>	I.	74
Musa-megon, <i>Mech.</i>	I.	144	Ng-gai, <i>Naga</i>	II.	337
Musamugon-buphang,			Ngrauran, <i>Naga</i>	II.	314
<i>Mech.</i>	I.	146	Nial, <i>Beng.</i>	I.	64
Musk-mallow, <i>Eng.</i>	I.	143	Nichu, <i>Beng.</i>	II.	323
Mustard, <i>Eng.</i>	I.	69	Niganibual, <i>Ass.</i>	I.	180
N			Nihor, <i>Jharua</i>	II.	223 & 341
Nabar, <i>Kuki</i>	II.	311	Nilotpala, <i>Sans.</i>	I.	64
Nachi-wagum,			Ni-padma, <i>Beng.</i>	I.	64
<i>Garó</i>	II.	203	Nim, <i>Ass. Beng.</i>	II.	227
Naga-lichí, <i>Ass.</i>	II.	323	Nimba, <i>Sans.</i>	II.	227
Naga-tenga, <i>Ass.</i>	II.	331	Nimtita, <i>Ass.</i>	II.	217
Nageswar, <i>Sans., Sylh.,</i>			Nimtita-arong, <i>Mik.</i>	II.	228
<i>Cach.</i>	I.	111	Nimukha, <i>Beng.</i>	I.	51
Nagini, <i>Ass.</i>	I.	177	Nitak-asing, <i>Miri</i>	II.	327
Nag-phena, <i>Ass.</i>	I.	153	Noga-bhe, <i>Ass.</i>	I.	119
Nag-phona, <i>Ass.</i>	I.	153	Noga-kola, <i>Ass.</i>	I.	39
Nahor, <i>Ass. & Miri</i>	I.	111	Nolsing, <i>Garó</i>	II.	234
Nahorabu, <i>Miri</i>	I.	158	Nona, <i>Beng.</i>	I.	43
Nah-pui, <i>Kuki</i>	II.	327	Nongnongbiki-ring-		
Nakaling-arong,			kang, <i>Mik.</i>	I.	6
<i>Mik.</i>	II.	285	Norlok-arong, <i>Mik.</i>	I.	39
Nak-chepeta, <i>Ass.</i>	I.	153	Nonth-arong, <i>Mik.</i>	I.	141
Nakhar-theng, <i>Kuki</i>	I.	157	Nonthler-arong,		
Nak-pek, <i>Tipp.</i>	I.	93	<i>Mik.</i>	I.	128
Nal, <i>Ass.</i>	I.	64	Nor-hing, <i>Ass.</i>	II.	208
Nalita, <i>Beng.</i>	I.	168	Northe-arong, <i>Mik.</i>	I.	168
Nalita-pat, <i>Beng.</i>	I.	168	Nrok-pen, <i>Naga</i>	I.	143
Nam-ahan-arong,			Nunchha, <i>Beng.</i>	II.	322
<i>Mik.</i>	I.	144	Nyngdong, <i>Manip.</i>	II.	198
Nammu-changne,			O		
<i>Daff.</i>	II.	329	Ochra, <i>Eng.</i>	I.	144
Nampiru-chin, <i>Mik.</i>	II.	306	Odal, <i>Ass., Mech.</i>	I.	151
Namsing-asing,			Odla, <i>Ass.</i>	I.	151
<i>Abor.</i>	II.	195	Ok-hi-siming-ti,		
Narasingha, <i>Ass.</i>	II.	206 & 208	<i>Mik.</i>	I.	173
Narcha, <i>Sylh.</i>	I.	158	Okshi, <i>Ass.</i>	I.	11
Nasser-bippang,			Onger-asing, <i>Miri</i>	&	
<i>Mech.</i>	I.	111	<i>Abor.</i>	II.	197
Naya-changney,			Ongret, <i>Naga</i>	II.	198
<i>Daff.</i>	II.	213	Ona, <i>Ass.</i>	I.	11
C					

	Part	Page		Part	Page
Oua-lota, <i>Ass.</i>	I.	10	Phaklang-jan-arong,		
Ou-lota, <i>Ass.</i>	I.	10	<i>Mik.</i>	II.	313
Ou-tenga, <i>Ass.</i>	I.	10	Phangput-arong,		
			<i>Mik.</i>	I.	31
P			Phapitemhaija,		
Padma, <i>Beng.</i> &			<i>Kuki</i>	I.	13
<i>Sans.</i>	I.	65	Pharkong-arong,		
Padragota, <i>Ass.</i>	II.	208	<i>Mik.</i>	I.	147
Pagrag, <i>Mik.</i>	II.	195	Pharna, <i>Mik.</i>	I.	142
Pahari, <i>Ass.</i>	I.	153	Pharun-barne, <i>Kh.</i>	II.	305
Pahari-jiga, <i>Jharua</i>	II.	221	Phata-poma, <i>Ass.</i>	II.	243
Pakna-kala, <i>Cach.</i>	I.	39	Phenil, <i>Sans.</i>	II.	320
Pakrak, <i>Mik.</i>	I.	146	Pherua-mek-rikang,		
Paling-changne,			<i>Mik.</i>	I.	55
<i>Daff.</i>	II.	203	Phikcharne-arong,		
Panchkol, <i>Ass.</i>	I.	10	<i>Mik.</i>	I.	111
Pandausa-baphang,			Phinel, <i>Goalp.</i>	I.	89
<i>Kach.</i>	II.	306	Phir, e-lera, <i>Nep.</i>	II.	273
Pang, <i>Lush.</i>	I.	148	Phisinda, <i>Sylh.</i>	I.	162
Pan-heng-heng,			Phoko, <i>Ass.</i>	II.	327
<i>Jharua</i>	I.	124	Phol-hoi, <i>Tipp.</i>	II.	337
Pani-amora, <i>Ass.</i>	II.	221	Pholoi-kung, <i>Tipp.</i>	II.	337
Pani-bel, <i>Hind.</i>	II.	292	Phong-arong, <i>Mik.</i>	I.	158
Pani-bokul, <i>Ass.</i>	I. 116 &	117	Pnong-rong-arong,		
Pani-jukiri, <i>Ass.</i>	I.	116	<i>Mik.</i>	I.	182
Pani-lara, <i>Nep.</i>	II.	291	Phonial, <i>Mech.</i>	I.	89
Pani-leteku, <i>Ass.</i>	II.	309	Phrado-baphang,		
Pani-lota, <i>Ass.</i>	II.	298	<i>Kach.</i>	II.	313
Pani-lowia, <i>Ass.</i>	I.	10	Phuhura, <i>Ass.</i>	I. 163 &	164
Paniposola, <i>Ass.</i>	I.	128	Phul-champa, <i>Ass.</i>	I.	178
Pani-sopa, <i>Ass.</i>	I.	179	Phul-hingori, <i>Ass.</i>	I.	182
Pan-sopa, <i>Ass.</i>	I. 14, 16, 25		Phul-kat, <i>Ass.</i>	I.	122
Papu-tadu-changne,			Phul-kobi, <i>Beng.</i>	I.	69
<i>Daff.</i>	I.	165	Phul-Rata, <i>Cach.</i> &		
Parokbithi-arong,			<i>Sylh.</i>	II.	237
<i>Mik.</i>	I.	14	Phul-sopa, <i>Ass.</i>	I. 16, 19 &	24
Pat, <i>Beng.</i>	I.	169	Phul-wal, <i>Garo</i>	I.	90
Pat-amari, <i>Mech.</i>	II.	237	Phunber-pui, <i>Lush.</i>	I.	153
Patamari, <i>Mech.</i>	II.	231	Phunchong, <i>Kuki</i>	I.	147
Pata-popuk-changne,			Phuphaira, <i>Sylh.</i>	II.	304
<i>Daff.</i>	I.	118	Phuroi-rikang, <i>Mik.</i>	I.	55
Pelte, <i>Lushai</i>	I.	106	Phutkuli, <i>Ass.</i>	I.	179
Pesondi, <i>Sylh.</i>	I.	162	Phuwathai, <i>Cach.</i>	II.	320
Petari, <i>Beng.</i>	I.	140	Pichola, <i>Ass.</i>	II.	327
Phag-lan-jan-arong,			Pichhola, <i>Ass.</i>	I.	146
<i>Mik.</i>	II.	327	Pichhola-lata, <i>Ass.</i>	I.	143
Phaibormarta, <i>Tipp.</i>	I.	158	Pinke-asing, <i>Miri</i>	II.	282
Phai-hershei, <i>Tipp.</i>	I.	113	Pinke-asing, <i>Miri</i>	II.	282
Phaithing, <i>Kuki</i>	I.	182	Pipi, <i>Jharua</i>	I.	162
Phakchena-lata, <i>Ass.</i>	I.	98	Pira-doukha, <i>Kach.</i>	I.	160

	Part	Page		Part	Page
Pisoli, <i>Ass.</i>	I.	162	Ragong, <i>Garó</i>	I.	173
Pitapushpa, <i>Sans.</i>	I.	140	Rahakhani-gangma,		
Piyu-nekphi, <i>Daff.</i>	II.	309	<i>Garó</i>	II.	306
Pleg-ik-arong, <i>Mik.</i>	II.	205	Rai, <i>Beng.</i>	I.	69
Podum, <i>Ass.</i>	I.	65	Rakkibhaing-asing,		
Pohu-udal, <i>Ass.</i>	I.	142	<i>Miri & Abor.</i>	II.	306
Pokitai, <i>Miri</i>	II.	268	Rakta-kamal, <i>Beng.</i>	I.	64
Polian, <i>Ass.</i>	I.	89	Raktotpala, <i>Sans.</i>	I.	64
Poma, <i>Beng., Ass., Sylh.,</i>			Ral-ling-rang,		
<i>Cach., Jharua</i>	I. 258	II. 242	<i>Kuki</i>	II.	280
Poma-arong, <i>Mik.</i>	II.	242	Ramnam-riube, <i>Miri</i>	I.	6
Poma-asing, <i>Miri</i>	II.	242	Rampak-arong, <i>Mik.</i>	I.	164
Pong-long-thing,			Ramphal, <i>Hind.</i>	I.	43
<i>Mik.</i>	I.	153	Rampun-kung,		
Pong-o-test, <i>Naga</i>	I.	180	<i>Tipp.</i>	I.	46
Ponial, <i>Ass.</i>	I.	89	Ramser, <i>Lush.</i>	II.	210
Poniol, <i>Ass.</i>	I.	89	Rangi-Rata, <i>Sylh.,</i>		
Ponju-phang, <i>Kach.</i>	I.	147	<i>Cach.</i>	I. 119 &	157
Ponthikechauphang,			Rasala, <i>Sans.</i>	II.	335
<i>Mik.</i>	II.	237	Rashwet, <i>Synt.</i>	I.	155
Popum, <i>Kh.</i>	I.	7	Rata, <i>Cach.</i>	II. 232 &	234
Porbotia-hengunia,			Rata-gogon, <i>Nep.</i>	I.	129
<i>Ass.</i>	I.	130	Ratapangpa, <i>Tipp.</i>	II.	234
Porbotia-sengunia,			Ratasahatta, <i>Lush.</i>	II.	231
<i>Ass.</i>	I.	128	Rata-tuni, <i>Nep.</i>	II.	241
Poreng, <i>Ass.</i>	I. 173 &	180	Rathang-phang,		
Porteng-phang,			<i>Cach.</i>	II.	229
<i>Kach.</i>	I.	34	Rebab-tenga, <i>Ass.</i>	II.	215
Prangso-arong, <i>Mik.</i>	I.	106	Rebo-singking,		
Prangsu, <i>Mik.</i>	I.	106	<i>Abor.</i>	II.	214
Premjila-khosa,			Rengran, <i>Garó</i>	I.	105
<i>Kach.</i>	I.	78	Rhuibom, <i>Kuki</i>	I.	48
Puinii-phul, <i>Beng.,</i>			Rikam-ruibi, <i>Miri</i>	II.	201
<i>Nep.</i>	II.	185	Rikang-thipu, <i>Mik.</i>	II.	298
Pukhal, <i>Sylh.</i>	I.	65	Rikhabok, <i>Garó</i>	I.	157
Pumelo, <i>Eng.</i>	II.	215	Riko-riubi, <i>Miri</i>	II.	277
Pumi-aye, <i>Miri</i>	I.	164	Rimot, <i>Garó</i>	II.	314
Pumplang, <i>Mik.</i>	I.	10	Ring, <i>Ass.</i>	II.	216
Pung-i-tabri, <i>Daff.</i>	I.	158	Ringkang-ak-ik-arong,		
Pura-koroi, <i>Sylh.</i>	I.	165	<i>Mik.</i>	II.	285
Pursho-bhola, <i>Nep.</i>	II.	333	Ringok-me, <i>Garó</i>	II.	237
Putichhal, <i>Ass.</i>	II.	217	Risut-riubi, <i>Miri</i>	&	
Putichhal-asing,			<i>Abor.</i>	I.	160
<i>Miri</i>	II.	217	Ritha, <i>Ass., Beng.</i>	II.	320
Putisal, <i>Miri</i>	II.	217	Riukhong-pieng,		
			<i>Kh.</i>	II.	307
			Rohimala, <i>Ass.</i>	II.	221
			Rohimola, <i>Ass.</i>	II.	221
			Rokpoletak, <i>Miri</i>	&	
			<i>Abor</i>	II.	245

	Part	Page		Part	Page
Rolang-phang,			Samphal-bol, <i>Garô</i>	II.	323
<i>Cach.</i>	II.	229	Samphot-rikang,		
Ron, <i>Kuki</i>	I.	173	<i>Mik.</i>	I.	10
Rongi-Rata, <i>Cach.</i>	II.	237	Samshu, <i>Kach.</i>	I.	66
Rouni-poma, <i>Kach.</i>	II.	221	Sam-sweng, <i>Garô</i>	II.	206
Rowai-thing, <i>Naga</i>	I.	87	Samtameh, <i>Kh.</i>	II.	325
Roy-baghini, <i>Ass.</i>	I.	93	Sam-thai, <i>Mech. &</i>		
Rudrai, <i>Ass.</i>	I.	172	<i>Cach.</i>	I.	14
Rudraksha, <i>Sans.,</i>			Samthakkhari, <i>Garô</i>	I.	141
<i>Beng.</i>	I.	172	Samthe, <i>Garô</i>	I.	141
Ruija, <i>Kuki</i>	I.	151	Sangkru-arong, <i>Mik.</i>	I.	151
Rulang-buphang,			Sangongri, <i>Garô</i>	I.	6
<i>Kach.</i>	I.	39	Sanjari bandeo		
Rumu, <i>Ass.</i>	II.	266	<i>Mech.</i>	II.	286
Rupohi-thequera,			Sankonaro, <i>Ass.</i>	II.	327
<i>Ass.</i>	I.	106	Sanku-nuru, <i>Daff.</i>	I.	178
Rupun-asing, <i>Miri</i>	I.	99	San-mani, <i>Mech.</i>	II.	208
			Santhlung-suirhui,		
S			<i>Lush.</i>	II.	206
Saben-bukben-asing,			Saragphula, <i>Ass.</i>	II.	216
<i>Miri</i>	I.	93	Sarang, <i>Mech.</i>	I.	182
Sacred bamboo,			Sarebilijira, <i>Cach.</i>	II.	205
<i>Eng.</i>	I.	63	Sare-gogon, <i>Nep.</i>	I.	129
Sada-hurhuria,			Sarlok-asing, <i>Abor.</i>	II.	313
<i>Beng.</i>	I.	73	Sarmon-blai, <i>Synt.</i>	II.	203
Sada-rai, <i>Beng.</i>	I.	69	Saryng-khlem,		
Sagladi, <i>Ass.</i>	II.	208	<i>Synt.</i>	II.	203
Saglepapio, <i>Miri</i>	I.	153	Saseni, <i>Ass.</i>	I.	124
Sahata-pui, <i>Kuki</i>	II.	234	Satkorâ, <i>Sylh.</i>	II.	214
Sahatcha-kung,			Satrai-phang, <i>Cach.</i>		
<i>Tipp.</i>	II.	237	<i>Kach.</i>	II.	224
Saijna, <i>Beng.,</i>			Selbal, <i>Garô</i>	II.	186
<i>Hind.</i>	II.	342	Seleng, <i>Ass.</i>	I. 173 &	174
Sajina, <i>Ass.</i>	II.	342	Senam-longda, <i>Mik.</i>	I.	164
Sajira, <i>Ass.</i>	I.	86	Senatur, <i>Lush.</i>	I.	74
Sakhipelhnâm,			Senem-phang, <i>Kach.</i>	I.	31
<i>Lush.</i>	I.	158	Sentebel, <i>Kuki</i>	I.	114
Sal, <i>Ass.</i>	I.	135	Serbuli, <i>Kach.</i>	I.	87
Sal tree, <i>Eng.</i>	I.	135	Serebilijira, <i>Cach.</i>	II.	205
Sam-arang, <i>Garô</i>	II.	298	Sergok-asing, <i>Miri &</i>		
Samdaukhi, <i>Kach.</i>	II.	206	<i>Abor.</i>	I.	151
Sam-haplan, <i>Kach.</i>	II.	268	Serio-asing, <i>Miri &</i>		
San-khatsi, <i>Garô</i>	I.	208	<i>Abor.</i>	I.	24
Sam-knon-thai,			Serjo-asing, <i>Miri</i>	I.	22
<i>Cach.</i>	I.	141	Serpai, <i>Kuki</i>	I.	113
Sam-kunthon, <i>Cach.</i>	I.	140	Shaddock, <i>Eng.</i>	II.	215
Samnabat, <i>Garô</i>	II.	327	Shailouk-rong-		
Sampa, <i>Miri</i>	I.	10	buphang, <i>Kach.</i>	I.	87
Samphal, <i>Garô</i>	II. 236 &	237	Shalmali, <i>Sans.</i>	I.	147
			Shaluk, <i>Beng.</i>	I.	64

	Part	Page		Part	Page
Shamakubu, <i>Kuki</i>	II.	247	Silum-pakia, <i>Abor.</i>	&	
Shamgangri, <i>Garo</i>	I.	6	<i>Miri</i>	II.	224
Shanpi, <i>Garo</i>	II.	322	Simal, <i>Hind.</i>	&	
Shap, <i>Kh.</i>	I.	22	<i>Beng.</i>	I.	147
Shashni-jamir,			Simla, <i>Mech.</i>	I.	147
<i>Sylh.</i>	II.	213	Simolu, <i>Ass.</i>	I.	147
Sheng-lokso, <i>Mik.</i>	II.	217	Simul, <i>Hind.</i>	&	
Snerolli-phang,			<i>Beng.</i>	I.	147
<i>Cach.</i>	II.	215	Sinam-jola, <i>Kach.</i>	I.	38
Sher-kharuang, <i>Kh.</i>	II.	277	Singani, <i>Nep.</i>	I.	158
Shia-sien-ung,			Singiasing, <i>Miri</i>	I.	147
<i>Kh.</i>	II.	203	Sing-i-te, <i>Kuki</i>	II.	198
Shing-keng, <i>Abor.</i>	I.	138	Singka-asing, <i>Miri</i>	&	
Shokshi-maring,			<i>Abor.</i>	II.	216
<i>Garo</i>	I.	94	Sing-khrau, <i>Manip.</i>	I.	128
Shokshimarong,			Singnam-longdak,		
<i>Garo</i>	I.	85	<i>Mik.</i>	I.	165
Shriew-u-pubon, <i>Kh.</i>	I.	65	Sinke-laktok, <i>Abor.</i>	II.	282
Shumi-chheng,			Sinsri-kanthou,		
<i>Garo</i>	II.	196	<i>Kach.</i>	II.	207
Shushru-thai, <i>Kach.</i>	I.	106	Siri-asing, <i>Miri</i>	I.	87
Sia-dokha (fish bone),			Sinta, <i>Sylh.</i>	&	
<i>Kh.</i>	I.	92	<i>Cach.</i>	I.	182
Sial-phosra, <i>Nep.</i>	I.	163	Si-san, <i>Kh.</i>	II.	262
Sia-nahor, <i>Ass.</i>	I.	113	Sipop-asing, <i>Abor.</i>	I.	157
Sia-soh-sat, <i>Kh.</i>	II.	203	Sita, <i>Sylh.</i>	& <i>Cach.</i>	I.
Sibe-dotke, <i>Miri</i>	&		Sitaphal, <i>Hind.</i>	I.	43
<i>Abor</i>	I.	73	Siti-asing, <i>Miri.</i>	II.	231
Sibe-dumpuk, <i>Miri</i>	I.	182	Situk-payu, <i>Abor.</i>	II.	231
Sibe-tabu, <i>Abor.</i>	&		Siyal-knata, <i>Beng.</i>	I.	66
<i>Miri</i>	I.	182	Skum-synsar, <i>Kh.</i>	I.	37
Sibe-tulpi, <i>Abor.</i>	I.	87	Sochopa-tenga, <i>Ass.</i>	I.	108
Sib-jaul, <i>Beng.</i>	II.	313	Soh-Bel, <i>Kh.</i>	II.	215
Sibon-asing, <i>Abor.</i>	II.	221	Soh-byrthit, <i>Kh.</i>	I.	141 & 168
Sibrai-etam, <i>Kach.</i>	II.	275	Soh-byrthit-rit, <i>Kh.</i>	I.	140
Sibrai-ia-dam,			Soh-bythrid, <i>Kh.</i>	I.	167
<i>Cach.</i>	II.	273	Soh-dadin, <i>Kh.</i>	II.	263
Sidumbulli-asing,			Soh-dieng-lang, <i>Kh.</i>	II.	228
<i>Miri</i>	II.	309	Soh-eit-blanc, <i>Kh.</i>	I.	166
Sidum-sipiag, <i>Abor.</i>	I.	144	Soh-iong-trong-		
Sikrai, <i>Ass.</i>	I.	93	kynthei, <i>Kh.</i>	II.	262
Sikraguti, <i>Ass.</i>	I.	93	Soh-jing-buin, <i>Kh.</i>	II.	200
Silampakiak, <i>Miri</i>	II.	225	Sohjina, <i>Beng.,</i>		
Silem-phang, <i>Kach.</i>	I.	31	<i>Hind.</i>	II.	342
Sileng-asing, <i>Miri</i>	&		Son-khyllam-ai-		
<i>Abor.</i>	II.	216 & 241	blang, <i>Kh.</i>	I.	180
Silk cotton tree,			Soh-khyllam-eit-		
<i>Eng.</i>	I.	147	blang, <i>Kh.</i>	I.	180
Silkhoh, <i>Garo</i>	II.	208	Soh-kymphor, <i>Kh.</i>	II.	214
Silling, <i>Miri</i>	II.	237			

	Part	Page		Part	Page
Tauling-asikur,			Thaidubriki-buphang,		
<i>Cach.</i>	II.	281	<i>Cach.</i>	II.	239
Tantri, <i>Nep.</i>	I.	11	Thai-gangdi-hegra-		
Tarak-asing, <i>Miri</i> &			bidingdoukha,		
<i>Abor.</i>	I.	105	<i>Cach.</i>	II.	280
Taramani, <i>Beng.</i>	I.	69	Thai-ganggi, <i>Kach.</i>	II.	279
Target-riube, <i>Miri</i>	II.	253	Thai-gangi-jola,		
Taruk-pai-asing,			<i>Cach.</i>	II.	280
<i>Miri</i> & <i>Abor.</i>	I.	178	Thai-gangni-hagra		
Tasemayang-changne,			(gedeba), <i>Cach.</i>	II.	281
<i>Daff.</i>	I.	42	Thai-girip-thing,		
Tasung-changne,			<i>Kuki</i>	I.	163
<i>Daff.</i>	II.	205	Thaiguja-baphang,		
Tatera, <i>Nep.</i>	I.	11	<i>Kach.</i>	II.	335
Tatke-riubi, <i>Miri</i> &			Thai-khrok, <i>Mech.</i>	II.	321
<i>Abor.</i>	II.	282	Thaknuokisin-		
Tatom-pelom-changne,			bapang, <i>Cach.</i>	II.	234
<i>Daff.</i>	I.	153	Thailaokhrong,		
Tauling-asi-kur,			<i>Mech.</i>	I.	87
<i>Cach.</i>	II.	281	Thaila-phrong-		
Tea plant, <i>Eng.</i>	I.	122	baphang, <i>Mech.</i>	I.	87
Tehei-chi-ching,			Thailokhrong,		
<i>Naga</i>	I.	173	<i>Cach.</i>	I.	153
Tejhi-arong, <i>Mik.</i>	II.	221	Thai-mado, <i>Kach.</i>	II.	228
Teji-arong, <i>Mik.</i>	II.	338	Thaimodo-dukha,		
Tejmai-bih, <i>Ass.</i>	II.	201	<i>Kach.</i>	II.	313
Teju, <i>Nep.</i>	II.	217	Thaipomlien, <i>Lush.</i>	I.	107
Tekra, <i>Garo</i>	I.	105	Thaisa-gulangi,		
Tekundu-phang,			<i>Kach.</i>	II.	211
<i>Cach.</i>	I.	151	Thai-saiya-suggur-		
Tel-bhurki, <i>Ass.</i>	I.	92	bidingdoukha,		
Telo, <i>Cach.</i>	I.	114	<i>Kach.</i>	II.	211
Tempor, <i>Ass.</i>	I.	110	Thaisen-phang,		
Tepari, <i>Beng.</i>	I.	140	<i>Kach.</i>	I.	39
Tepopasing <i>Miri</i>	I.	157	Thaisin-jola, <i>Kach.</i>	II.	32
Tepop-pomik, <i>Abor.</i>	I.	155	Thai-slao-gundi-		
Tepop-paptok, <i>Abor.</i>	I.	157	khasiba, <i>Cach.</i>	I.	89
Tepot-tenga, <i>Ass.</i>	I.	104	Thaisram-phang,		
Tepor, <i>Ass.</i>	I.	104	<i>Kach.</i>	II.	309
Tera, <i>Manip.</i>	I.	148	Thaisudi-phang,		
Terpui, <i>Lush.</i>	I.	128	<i>Kach.</i>	II.	340
Tes-moi, <i>Mech.</i>	II.	201	Thai-thor, <i>Kuki</i>	II.	236
Tetere-asing, <i>Miri</i>	I.	17	Thakhau-phang,		
Tew-kalong, <i>Kh.</i>	II.	202	<i>Cach.</i>	II.	231
Tezmoi, <i>Ass.</i>	II.	201	Thakri-arong, <i>Mik.</i>	II.	279
Tezmuri, <i>Ass.</i>	II.	201	Thaltre, <i>Lush.</i>	I.	169
Thagit, <i>Mech.</i>	I.	11	Thang-ksem, <i>Kh.</i>	I.	13
Thai-a-dou, <i>Cach.</i>	I.	163	Thanim-nium-kra,		
Thai-dau-ing, <i>Kuki</i>	II.	236	<i>Daff.</i>	I.	76
Thaidi, <i>Cach.</i>	I.	10			

	Part	Page		Part	Page
Thanim-nium-kre,			Thengpi-kundu-		
<i>Akz</i>	I.	76	arong, <i>Mik.</i>	I.	89
Thanthani, <i>Sylh.</i>	I.	156	Theng-piopsu, <i>Mik.</i>	I.	32
Tharbi-arong, <i>Mik.</i>	II.	335	Theng-pisuni, <i>Mik.</i>	II.	256
Thaukhu-kho-khra,			Theng-pitula-arong,		
<i>Garó</i>	II.	327	<i>Mik.</i>	I.	158
Inaura-guti, <i>Ass.</i>	I.	164	Theng-pituli, <i>Mik.</i>	I.	158
The-bong-dar-arong,			Thengpitungmeng,		
<i>Mik.</i>	I.	163	<i>Mik.</i>	II.	205
The-bong-kok, <i>Mik.</i>	I.	87	Theng-pranke-arong,		
The-bongthar, <i>Mik.</i>	I.	87	<i>Mik.</i>	I.	162
Thechu, <i>Garó</i>	I.	109	Theng-rali, <i>Mik.</i>	II.	241
Thegdi-bapahng,			Theng-rompa, <i>Mik.</i>	I.	164
<i>Cach.</i>	I.	10	Theng-sah-soh-arong,		
Theibar, <i>Tipp.</i>	I.	186	<i>Mik.</i>	II.	206
Thei-rhei-ol, <i>Kuki</i>	II.	192	Thengsakso, <i>Mik.</i>	II.	208
Thei-snong-pung,			Theng-sang-proth-		
<i>Kuki</i>	I.	87	arong, <i>Mik.</i>	II.	256
Thei-wok-ek, <i>Kuki</i>	I.	39	Theng-tune, <i>Mik.</i>	II.	256
Thekachu, <i>Garó</i>	II.	335	Thenthe-lau-phang,		
Thekakhaksi, <i>Garó</i>	I.	106	<i>Cach.</i>	II.	197
Thekejoy, <i>Mik.</i>	II.	309	Theny-ngoitheh,		
Tnekjoai, <i>Mik.</i>	II.	309	<i>Tipp.</i>	II.	256
Thelu-rikang, <i>N. C.</i>			Ther-um, <i>Kh.</i>	I.	160
<i>Hills</i>	II.	285	Thesampreng, <i>Mik.</i>	I.	104
Themdou-phang,			Theseli-arong,		
<i>Kach.</i>	II.	228	<i>Mik.</i>	II.	341
Theng-are-arong,			Theseming, <i>Mik.</i>	I.	34
<i>Mik.</i>	II.	229	Thibongthar, <i>Mik.</i>	I.	87
Theng-chi-kong-long,			Thi-dak-dak-arong,		
<i>Mik.</i>	I.	151	<i>Mik.</i>	II.	320
Theng-hanjan,			Thigisin, <i>Garó</i>	II.	218
<i>Mik.</i>	II.	195	Thikring, <i>Garó</i>	II.	223
Theng-hanjang,			Thing-ansil, <i>Kuki</i>	I.	155
<i>Mik.</i>	I.	125	Thing-batiat, <i>Kuki</i>	I.	93
Theng-hanse, <i>Mik.</i>	II.	208	Thing-buphai,		
Theng-khi, <i>Garó</i>	II.	279	<i>Kuki.</i>	II.	186
Thengkhi-makbil,			Thing-erkum,		
<i>Garó</i>	II.	281	<i>Kuki.</i>	II.	327
Theng-kippi, <i>Mik.</i>	II.	234	Thing-aran, <i>Kuki</i>	II.	332
Theng-koreng-arong,			Thing-khim, <i>Lush.</i>	II.	312
<i>Mik.</i>	I.	173	Thing-khoi-nath,		
Theng-lokso-arong,			<i>Kuki</i>	II.	338
<i>Mik.</i>	II.	205	Thing-nhap-khir,		
Theng-nang-arong,			<i>Kuki</i>	I.	164
<i>Mik.</i>	II.	197	Thing-pat-kui,		
Theng-phrang-ki-			<i>Tipp.</i>	I.	182
arong, <i>Mik.</i>	I.	162 & 173	Thing-phelem,		
Thengpiani-arong,			<i>Kuki</i>	I.	155
<i>Mik.</i>	I.	90			

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	Part	Page		Part	Page
Unboi, <i>Ass.</i>	I.	31	Wapel-ek-rang,		
Undurmala-biphang,			<i>Kuki</i>	I.	55
<i>Mech.</i>	I.	172	Warlap-rikang,		
Upak, <i>Garó</i>	I.	151	<i>Mik.</i>	II.	203
Uri-ising-thokphi,			Warpokhu, <i>Mik.</i>	I.	160
<i>Manip.</i>	II.	302	Watercress, <i>Eng.</i>	I.	70
Usipag, <i>Miri</i>	I.	144	White climber,		
Usipak, <i>Miri</i>	I.	144	<i>Eng.</i>	I.	5
Utham-ban, <i>Manip.</i>	I.	13	White silk cotton tree		
Uthau, <i>Manip.</i>	I.	111	<i>Eng.</i>	I.	148
Uthou, <i>Manip.</i>	I.	87	Wild mango, <i>Eng.</i>	II.	337
			Wild tea, <i>Eng.</i>	I.	33 & 90
V			Wo-chora-a-anarong,		
			<i>Mik.</i>	II.	205
Van-tha-mu-thing,			Wokek-turang,		
<i>Kuki</i>	I.	172	<i>Mik.</i>	II.	236
			Wokner, <i>Kuki</i>	II.	281
W			Wok-thing-thel.		
			<i>Kuki</i>	I.	146
Waisil-thing,				Y	
<i>Lush.</i>	I.	157	Yabi-changne,		
Wai-thel-te-thing,			<i>Daff.</i>	I.	124
<i>Kuki</i>	I.	164	Yao-laisa-phang,		
Walgem, <i>Garó</i>	I.	151	<i>Cach.</i>	II.	247
Wang-la-bei, <i>Kh.</i>	II.	237			

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